GASTROESOPHAGEAL JUNCTION ADENOCARCINOMA

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BONAFIDE CERTIFICATE

Certified that this dissertation is the bonafide work of **Dr. SANDEEP . R** on **“GASTROESOPHAGEAL JUNCTION ADENOCARCINOMA – A STUDY“** during his M.S. (General Surgery) course from May 2005 to March 2008 at the Government Kilpauk Medical College and Government Royapettah Hospital, Chennai.

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CONTENTS

Introduction

The rising incidence adenocarcinomas of the region around esophago–gastric junction have become an important clinical topic.

Adenocarcinoma of the distal esophagus, once an unusual malignancy, is diagnosed with increasing frequency and now accounts for over 50 percent of esophageal cancers in our country. The gross appearance resembles that of squamous cell carcinoma. Microscopically, adenocarcinoma almost always originates in metaplastic Barrett's mucosa, and resembles gastric cancer. The most important etiologic factor is a metaplastic columnar-lined or Barrett's esophagus, which occurs as a complication in approximately 10 percent of patients with gastroesophageal reflux disease. The incidence of adenocarcinoma in a patient with Barrett's esophagus when studied prospectively is 1 in 100 patient years of follow-up - at least 30 to 40 times that expected for a similar population without Barrett's esophagus. This risk is similar to the risk for developing lung cancer in a person with a 20 pack per year history of smoking.

Gastric carcinoma is the most common cancer worldwide and is now surpassed only by lung cancer in incidence .There has been a noticeable shift in the site of gastric cancer from the distal stomach to the more proximal stomach over the past several decades. The incidence of adenocarcinoma of the gastric cardia has increased steadily while the incidence of cancer in other anatomic subsites has decreased. The increase is possibly linked to a history of smoking, obesity, food practices or heavy alcohol use.

Over the past, the discussions of gastroesophageal junction tumors have been overshadowed by confusion about the type of junctional tumors. Following a consensus conference of the International Society for Diseases of the Esophagus (ISDE) and the

International Gastric Cancer association (IGCA) an agreement has been achieved for classification of adenocarcinomas arising in the area of the esophago–gastric junction .This classification is based on topographic anatomic characteristics and the location of the tumor center above, at, or below the gastric cardia as suggested by Siewert et al. The anatomical landmark (fig 1) that remains at the center of this anatomical classification is the endoscopic ‘cardia’, defined as the oral end of the typical longitudinal gastric mucosa folds. In AEG Type I the tumor is located above this endoscopically defined cardia, in AEG Type II the tumor center or tumor mass is in the area of the endoscopic cardia, in AEG Type III the tumor. These cancers are generally considered to be biologically aggressive; with overall 5-year survival rates below 10% .Surgical resection is the mainstay of therapy in patients with invasive adenocarcinoma who are fit for surgery. Complete removal of the primary tumor and its lymphatic drainage has to be the primary goal of any surgical approach to adenocarcinoma of the gastroesophageal junction.

This study is an audit of the AEG managed in GRH. An attempt is made to identify the factors to improve the outcome of these patients.

Review of Literature

2.1 TISSUE COMPOSITION OF THE ESOPHAGUS, GE JUNCTION AND STOMACH

ESOPHAGUS(fig 2)

[95]Tunica Mucosa

Squamous epithelium is of the stratified, nonkeratinizing type. It covers the tubular esophagus.

Lamina Propria Mucosa

It consists of connective tissue built up of areolar, elastic and collagenous fiber networks. Esophageal mucosa contains exclusively alveolar serous glands, follicles, esophageal glands of mucous type, and, in the terminal esophagus, glands that resemble cardiac glands. Projecting into the epithelium, the layer forms the papillae.

Lamina Muscularis Mucosa

The lamina muscularis mucosa is a thin layer of short smooth muscle bundles.

Tela Submucosa

The fatty and relatively thick submucosa permits considerable mobility of the esophageal mucosa. The submucosa contains the mucous glands, blood vessels, the Meissner neural plexus, and an extensive lymphatic network.

Tunica Muscularis

The muscle of the esophagus consists longitudinally arranged outer layer and a transverse inner layer. Between the two muscular layers is a thin intramuscular septum of connective tissue that contains fine blood vessels and ganglion cells (Auerbach plexus). The esophagus lacks a serosa and is surrounded by a layer of loose fibroalveolar adventitia

GASTRIC WALL

Serosa

The serosa is nothing more than the peritoneum, a thin layer of loose connective tissue underlying a layer of simple squamous mesothelium.

Muscular Layer

Three well-known layers of musculature: an outer longitudinal layer, middle circular layer, and inner oblique layer. The surgeon considers the three layers as one in the operating room

Submucosal Layer

Called the "vascular layer" ,the submucosa is composed of loose, areolar connective tissue which connects the mucosa to the external musculature.

Mucosal Layer[95]

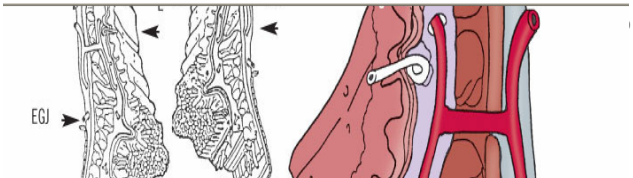
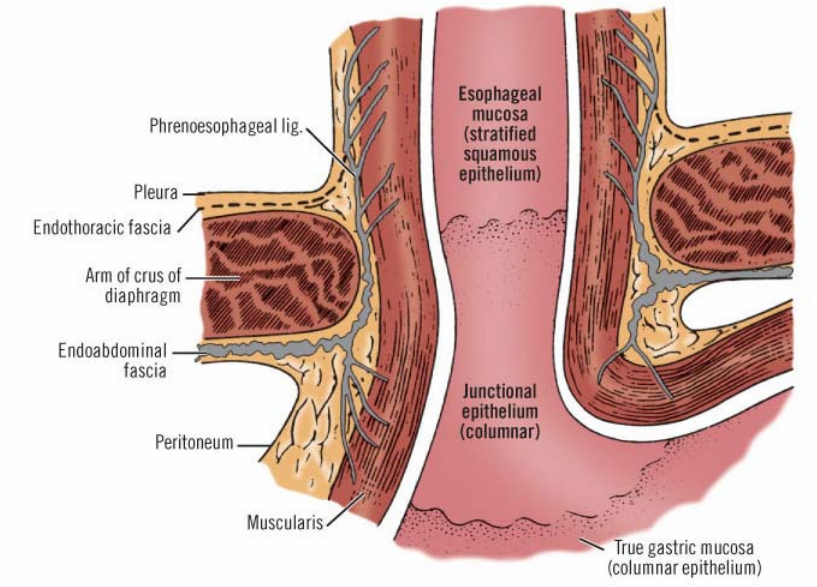


FIG :2 :tissue organization of the esophagus

the esophagogastric junction *(EGJ)*



2.2 ANATOMY

2.2.1 SURGICAL ANATOMY OF THE ESOPHAGUS

Position of the Esophagus

It begins where the pharynx ends at the level of the C-6 vertebra and ends at the cardia of the stomach, some 3 to 5 cm below the diaphragm opposite the twelfth thoracic vertebra. The esophagus is a midline structure anterior to the spine and posterior to the trachea. It passes into the thorax at the level of the sternal notch and travels caudally within the chest in the posterior mediastinum. The esophageal hiatus of the diaphragm is at the level of the tenth thoracic vertebra[95].

Designations of the Esophagus

The esophagus has been classified from three different medical perspectives: classical anatomy, function, and surgical understanding. (fig 3)

Classical anatomy divides the esophagus into three parts:

1. Cervical
2. Thoracic
3. Abdominal

Surgeons can benefit from viewing the esophagus as a two-part structure divided into proximal and distal segments bordering at the tracheal bifurcation .This approach best matches surgical needs and therapeutic strategies. There are three reasons for this approach[95]:

(1) Antipodal lymphatic flow proceeds from the area of the tracheal bifurcation cranially and caudally. This affects the direction of early lymphatic tumor spread and the procedures of lymphadenectomy.

(2). The prognosis for distal tumors is far better than that for the rarer tumors located in the proximal half of the esophagus. Proximal tumors also rapidly perforate the esophageal wall to invade adjacent structures such as the trachea, bronchi, and adjacent spaces such as the mediastinum.

(3) This classification conforms with the embryologic development from two different tissue sources and the specific arrangement of vessels, muscle types, and innervation.

LOWER ESOPHAGEAL SPHINCTER

LES [95]is located at the terminal end of the esophagus and represents the distal 3 to 5 cm of the organ. Most of the LES lies within the abdominal cavity. A small condensation of circular smooth-muscle fibers resides in this region, too indefinite to constitute an anatomical sphincter. The specialized nature and unique innervation of the smooth muscle of the terminal esophagus provide the basis for a physiological sphincter. The LES is a high-pressure zone interposed between the body of the esophagus and the cardia of the stomach .Normally, a mean pressure of 20 ± 5mmHg is maintained at all times except during swallowing, when the pressure falls to 0mmHg, allowing esophageal peristalsis to empty the swallowed food into the stomach. In its resting state, therefore, the high pressure of the LES prevents reflux of gastric contents into the esophagus.

ARTERIAL SUPPLY

The esophagus[96] is nourished by numerous segmental arteries(fig 7). The cervical esophagus receives blood from the superior thyroid artery as well as the inferior thyroid artery of the thyrocervical trunk, with both sides communicating through collateral vessels. The major blood supply of the thoracic esophagus is from four to six aortic esophageal arteries, supplemented by collateral vessels from the inferior thyroid, intercostal and bronchial, inferior phrenic and left gastric arteries. The extensive venous drainage of the esophagus includes the hypopharyngeal, azygous, hemiazygous, intercostal, and gastric veins.

LYMPHATIC DRAINAGE

The esophagus has an extensive lymphatic drainage that consists of two lymphatic plexuses, one arising in the mucosa and the other in the muscular layer. Mucosal lymphatic capillaries pierce the muscular layer and drain to regional lymph nodes. These lymphatic capillaries run longitudinally in the esophageal wall before they exit through muscle into adjacent lymph nodes. The flow of lymphatics of the upper two thirds of the esophagus tends to be upward, whereas the distal third tends to be downward; however, all lymphatics intercommunicate. Therefore, esophageal carcinomas may spread directly to internal jugular nodes in the neck, paratracheal nodes in the superior mediastinum, subcarinal nodes in the middle chest, paraesophageal nodes in the lower mediastinum, and inferior pulmonary ligament, perigastric, and left gastric artery lymph nodes[96].

Fig 3: Arterial supply of the Esophagus

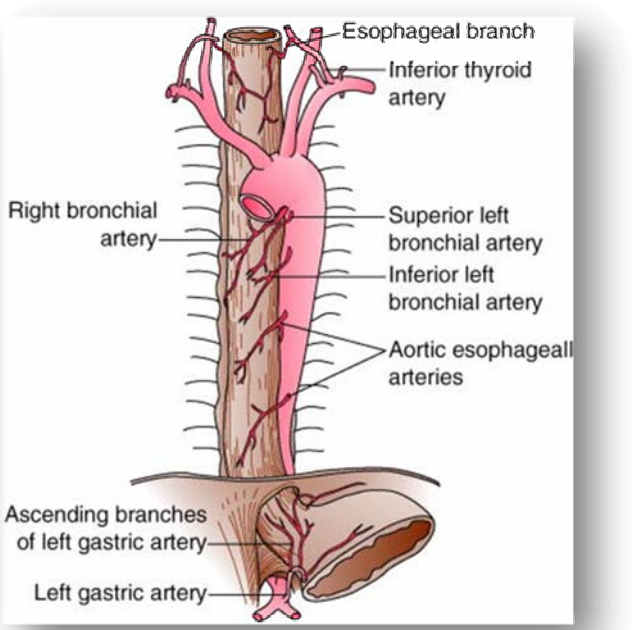
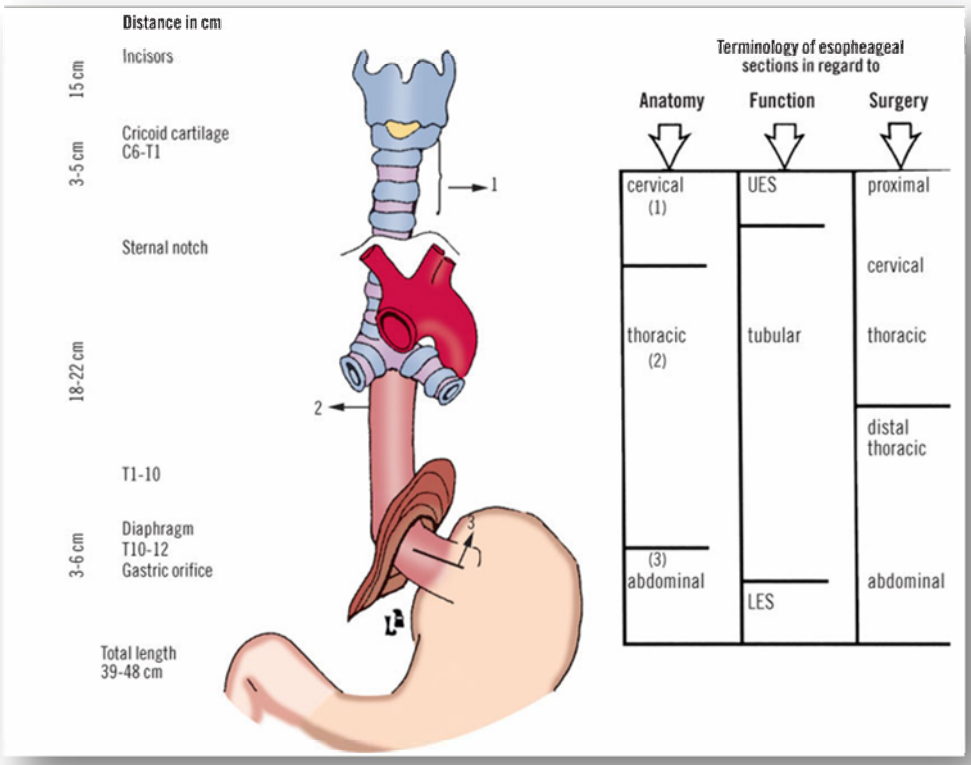


Fig 4 : Divisions, terminology, and relationships of the



2.2.2 SURGICAL ANATOMY OF THE STOMACH

GROSS ANATOMY

Wallace P. Ritchie, Jr., called the stomach an elegant organ, once thought to be the seat of the soul, always handy to bring to the dinner table, and a recognized source of ecstasy and grief[96].

The most proximal region of the stomach is called the *cardia*, and it attaches to the esophagus. Immediately proximal to the cardia is a physiologically competent lower esophageal sphincter. Distally, the pylorus connects the distal stomach (antrum) to the proximal duodenum. Although the stomach is fixed at the gastroesophageal (GE) junction and the pylorus, its large mid portion is mobile. The *fundus* represents the superior-most part of the stomach and is floppy and distensible. It is bounded superiorly by the diaphragm and laterally by the spleen. The body of the stomach represents the largest portion and is also referred to as the *corpus*. The body also contains most of the parietal cells and is bounded on the right by the relatively straight lesser curvature and on the left by the longer greater curvature. At the angularis incisura, the lesser curvature abruptly angles to the right. It is at this point that the body of the stomach ends and the antrum begins.

Another important anatomic angle (angle of His) is that which the fundus forms with the left margin of the esophagus. Most of the stomach resides within the left upper quadrant of the abdomen. The left lateral segment of the liver usually covers a large portion of the stomach anteriorly. The diaphragm, chest, and abdominal wall bound the

remainder of the stomach. Inferiorly, the stomach is attached to the transverse colon, spleen, caudate lobe of the liver, diaphragmatic crura, and retroperitoneal nerves and vessels. Superiorly, the GE junction is found about 2 to 3 cm below the diaphragmatic esophageal hiatus in the horizontal plane of the seventh chondrosternal articulation, a plane only slightly cephalad to that containing the pylorus. The gastrosplenic ligament attaches the proximal greater curvature to the spleen.

BLOOD SUPPLY

Most of the blood supply[96] to the stomach (fig 5) is from the celiac artery. There are four main arteries: the left and right gastric arteries along the lesser curvature and the left and right gastroepiploic arteries along the greater curvature. In addition, a substantial quantity of blood may be supplied to the proximal stomach by the inferior phrenic arteries and by the short gastric arteries from the spleen. The largest artery to the stomach is the left gastric artery, and it is not uncommon (15% to 20%) for an aberrant left hepatic artery to originate from it. The right gastric artery arises from the hepatic artery (or the gastroduodenal artery). The left gastroepiploic artery originates from the splenic artery, and the right gastroepiploic originates from the gastroduodenal artery. The extensive anastomotic connection between these major vessels ensures that, in most cases, the stomach will survive if three of four arteries are ligated, provided that the arcades along the greater and lesser curvatures are not disturbed. In general, the veins of the stomach parallel the arteries. The left gastric (coronary) and right gastric veins usually drain into the portal vein. The right gastroepiploic vein drains into the superior mesenteric vein, and the left gastroepiploic vein drains into the splenic vein.

LYMPHATIC DRAINAGE

Generally, the lymphatic drainage[96] (fig 6)of the stomach parallels the vasculature and essentially drains into four zones of lymph nodes as depicted in. The superior gastric group drains lymph from the upper lesser curvature into the left gastric and paracardial nodes. The suprapyloric group of nodes drains the antral segment on the lesser curvature of the stomach into the right suprapancreatic nodes. The pancreaticolienal group of nodes drains lymph high on the greater curvature into the left gastroepiploic and splenic nodes. The inferior gastric/subpyloric group of nodes drains lymph along the right gastroepiploic vascular pedicle. All four zones of lymph nodes drain into the celiac group and into the thoracic duct. Although the aforementioned lymph nodes drain different areas of the stomach, it remains widely recognized that gastric cancers may metastasize to any of the four nodal groups regardless of the cancer location. In addition, the extensive submucosal plexus of lymphatics accounts for the fact that there is frequently microscopic evidence of malignant cells several centimeters from the resection margin of gross disease.

Fig 5: Blood Supply of the Stomach.

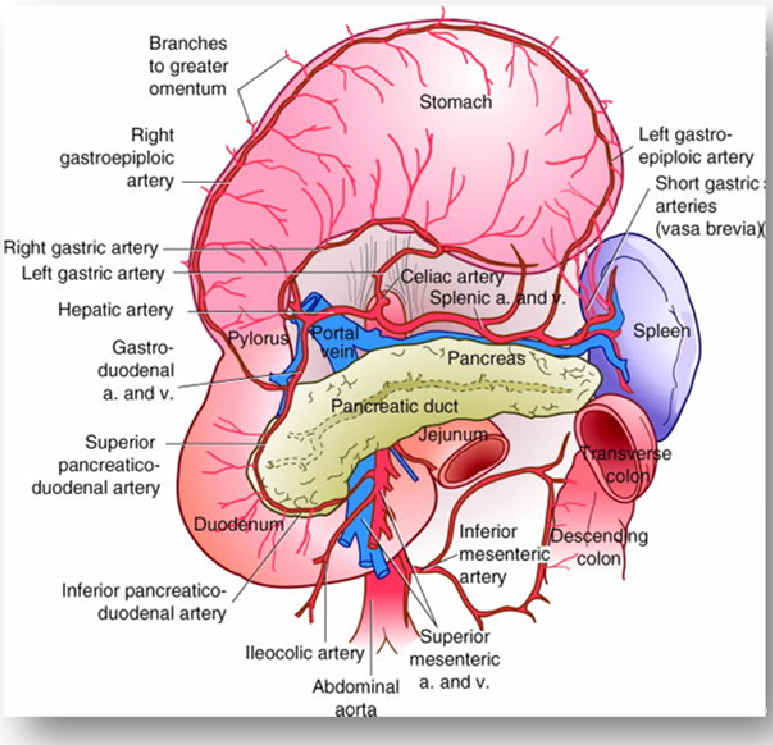
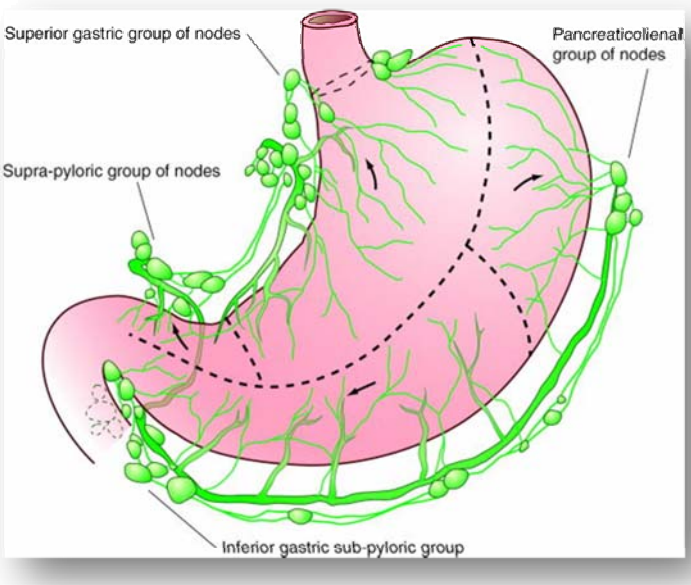


Fig 6 :Lymphatic drainage of the Stomach.



2.3.3 ANATOMY OF THE GE JUNCTION

The GE junction consists[95] of the distal esophagus, esophageal hiatus, and proximal stomach. The esophagus joins the stomach in the abdomen, just below the diaphragm. The length of the abdominal esophagus is from 0.5 to 2.5 cm.

Its relationships to surrounding structures are:

Anterior: Posterior surface of left lobe of liver

Posterior: Right crus of diaphragm, aorta

Right: Caudate (spigelian) lobe of liver

Left: Fundus of stomach

Points of Clinical and Surgical Relevance

The transition between the squamous esophageal and columnar gastric epithelium is an objectively recognizable reference point. This abrupt, serrated line, known as the Z-line, has "four to six small, long or short tongues." It is normally located near the gastric orifice or just above it. Endoscopists thus base their determination on differences in color, the degree of transparency of the epithelium, mucosal structure, and epithelial thickness. Any proximal shift of gastric- or intestinal-type columnar epithelium into the esophagus is considered pathological. The change results from long-lasting gastroesophageal reflux that causes chronic damage to the esophageal mucosa. The ultimate result may be that "the distal esophagus to a greater or lesser extent is

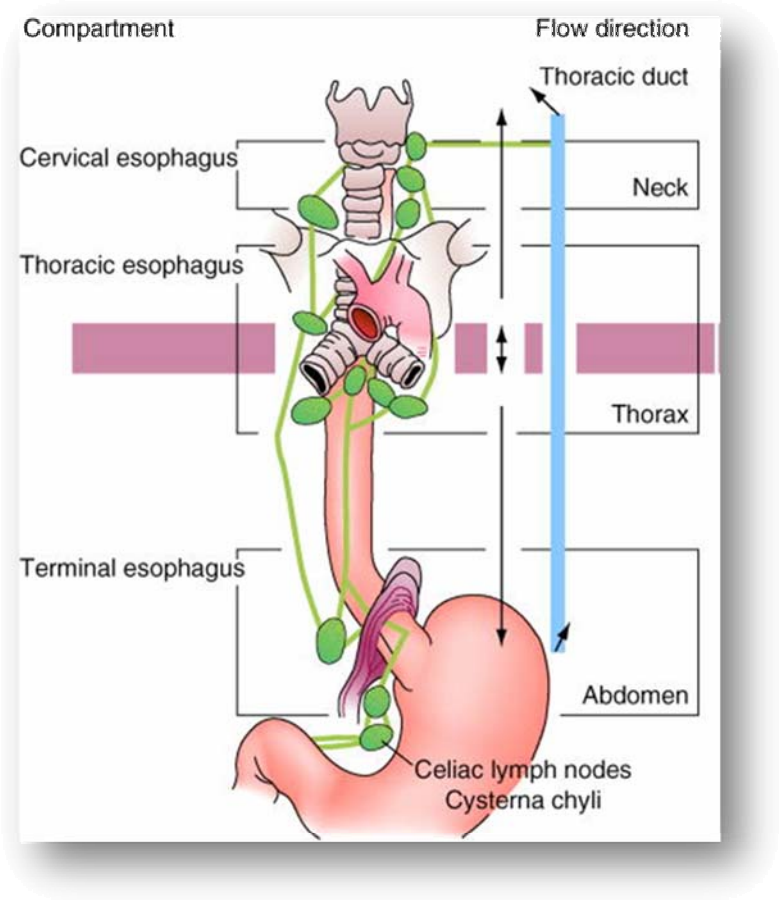
circumferentially lined by columnar epithelium transformed to the gastric or intestinal type. This pathology, called Barrett's esophagus, is regarded as a precancerous condition.

The histologic junction between the esophagus and stomach is not coincident with the external junction. In the cadaver, this epithelial junction lies about 1 cm above the external gross junction. Above the boundary, islands of columnar gastric epithelium may be present at all levels of the esophagus. Such heterotopic patches are not pathologic.

In the living patient, identification of the line of transition between esophagus and stomach is more complicated than in the cadaver. The submucosal tissue is so loose that the mucosa moves freely over the underlying muscularis, bulging in folds into the stomach at each swallow. Even at rest, the junctional level can change. Palmer, using silver markers on the epithelial boundary, found that the junction was lower in the full stomach than in the empty one.

The mucosa that lines the cardia of the stomach is distinct from the rest of the stomach. Its glands are mucus-secreting, without chief or parietal cells. These are the cardiac glands of the histologist. Hayward opposed the use of the word cardia, and characterizes terms derived from it as "insufferably vague." He suggested the term "junctional epithelium" for this area between the typical esophageal and typical gastric mucosae.

FIG 7 :Lymphatic drainage of the GE junction.



It has been hypothesized that the presence of cardiac mucosa at the gastroesophageal junction represents an early histologic manifestation of gastroesophageal reflux.

2.3 EPIDEMIOLOGY

Over the past quarter century, we have seen a shift in both the lethality and location of gastric cancers. Although distal gastric cancers have become rare the incidence of adenocarcinomas of the proximal stomach and distal esophagus has risen[1-3]. The behavior of these proximal tumors makes them an unique entity. The pliability of the gastric cardia as well as the deep location of the gastroesophageal junction, often masks the vague symptoms caused by early-stage lesions. Furthermore, due to the strategic location at the crossroads of two major body cavities, lymphatic spread occurs in two directions[4]—proximally into the mediastinum and distally to the celiac lymph nodes. Thus, these tumors often present at a relatively advanced stage[5].

Symptoms and signs

Occasional tobacco use

Variable alcohol consumption

Modest weight loss, if any

Robust body habitus

Mild dysphagia, rare odynophagia

Long-standing history of esophageal reflux and, often, recent improvement

in reflux symptoms

Frequent cardiovascular comorbidity

2.4 PATHOLOGY

Barrett's Esophagus

The British surgeon, Norman Barrett, first described the phenomenon of columnar epithelial metaplasia[98] of the normally squamous esophageal mucosa in1950. He first surmised that congenital rests of columnar epithelium accounted for these findings. It is now universally acknowledged that the process is related to injury and healing in the lower esophagus and, thus, it is an adaptation rather than a congenital anatomic aberration. Although Barrett's changes are frequent in patients with reflux symptoms, 40% of patients with Barrett's changes have minimal or no reflux symptoms. The association of Barrett's mucosa with adenocarcinoma place cancer risk in Barrett's in the range of 2-4%. This risk is higher with the type of Barrett's changes termed special columnar epithelium, as opposed to the cardiac and fundic histologic variety of Barrett's, although the former's substantial risk appears to be related to the higher risk of dysplasia with specialized columnar Barrett changes. Of great concern is the finding that correction of reflux by medical or surgical measures is frequently unsuccessful in reversing Barrett's changes and reducing the cancer risk. Blot et al's observations about increasing adenocarcinoma of the lower esophagus and observations that Barrett's mucosal changes are found in as many as 65% of patients with adenocarcinoma have, appropriately, focused a great deal of investigation into the causes and modification of these changes. Reversal of advanced Barrett's changes seldom occurs, whether the condition is managed medically using inhibitors of gastric acid production and prokinetics to stimulate gastric emptying or whether it is managed surgically with antireflux surgery.

For the present, however, the major focus is placed on careful follow-up of patients found to have Barrett's metaplasia. Subsequent endoscopic biopsies are performed to determine if any dysplasia has developed. Severe dysplasia merits consideration of prophylactic intervention.

MICROSCOPY

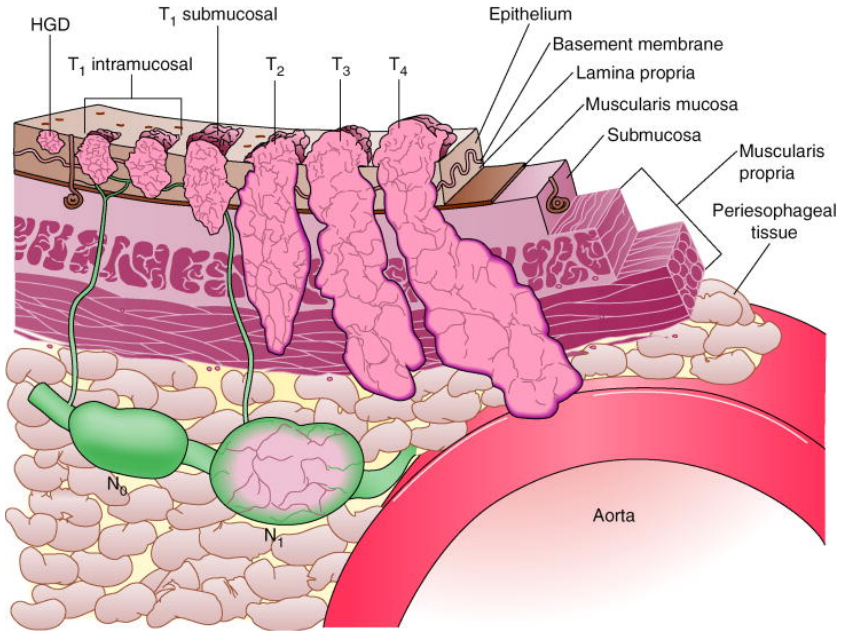
The microscopic characteristics of GE junctions tumors show grade 2 to grade 3 differentiation. Signet ring cells are present in both distal esophageal and proximal gastric tumors. There is microscopic evidence of barett's epithelium, especially type 1 tumors.

STAGING

T: Primary Tumor	Esophagus and cardia	Stomach
TX	Tumor cannot be assessed	Primary tumor cannot be assessed
T0	No evidence of tumor	No evidence of primary tumor
Tis	High-grade dysplasia	Carcinoma in situ: intraepithelial tumor without invasion of the lamina propria
T1	Tumor invades the lamina propria, muscularis mucosa, or submucosa; does not breach the submucosa	Tumor invades lamina propria or submucosa
T2	Tumor invades into but not beyond the muscularis propria	Tumor invades muscularis propria or subserosa
T3	Tumor invades the paraesophageal tissue but does not invade adjacent structures	Tumor penetrates serosa (visceral peritoneum) without invasion of adjacent structures
T4	Tumor invades adjacent structures	Tumor invades adjacent structures
N: Regional Lymph Nodes		
NX	Regional lymph nodes cannot be assessed	Regional lymph node(s) cannot be assessed
N0	No regional lymph node metastases	No regional lymph node metastasis
N1	Regional lymph node metastases	Metastasis in 1 to 6 regional lymph nodes
		Metastasis in 7 to 15 regional lymph nodes
		Metastasis in more than 15 regional lymph nodes
M: Distant Metastases		
MX	Distant metastases cannot be assessed	Distant metastasis cannot be assessed
M0		No distant metastasis
M1a	Lower thoracic esophagus metastatic to celiac lymph nodes	Distant metastasis
M1b	Lower thoracic esophagus metastatic to other nonregional lymph nodes or other distant sites	

Stage Groupings	T	N	M	T	N	M
Stage 0	Tis	N0	M0	Tis	N0	M0
Stage IA	T1	N0	M0	T1	N0	M0
Stage IB				T1 T2a/b	N1 N0	M0 M0
Stage IIA	T2 T3	N0 N0	M0 M0	T1 T2a/b T3	N2 N1 N0	M0 M0 M0
Stage IIB	T3 T4	N1 Any N	M0 M0			
Stage III A	T1 T2	N1 N1	M0 M0	T2a/b T3 T4	N2 N1 N0	M0 M0 M0
Stage III B				T3	N2	M0
Stage IV A	Any T	Any N	M1a	T4 T1–3 Any T	N1–3 N3 Any N	M0 M0 M1
Stage IV B	Any T	Any N	M1b			

From Rice TW: Esophageal carcinoma: Diagnosis and staging of esophageal carcinoma. In Pearson FG, Cooper JD, Deslauriers J, et al (eds):
Esophageal Surgery, 2nd ed. Philadelphia, Churchill Livingstone, 2002, p 686.
From AJCC Cancer Staging Manual, 6th ed. New York, Springer-Verlag, 2001.



2.6 PREOPERATIVE STAGING

Perhaps even more important than defining the subtype of gastroesophageal junction tumor is accurate pretreatment staging. Surgical resection offers the only chance for cure, and most patients undergoing R1 (residual microscopic disease) or R2 (residual macroscopic disease) resections could just as easily have been palliated with a combination of chemotherapy, radiation, and endoluminal stenting. Hence, determining both the extent of disease and local respectability is an essential step before commencing any type of therapy.

ENDOSCOPY AND BIOPSY (fig 8)

Preoperative endoscopy is usually the first test performed in diagnosing and staging the lesion. The findings on endoscopy are critical in determining the length and circumferential extension as well as the degree of obstruction the lesion causes, proximal extent of resection and ultimately dictate the appropriate operative approach. The extent of transmural invasion,however, is poorly evaluated . The presence or absence of Barrett's esophagus should be assessed carefully. Multiple biopsies must be obtained from the lesion and adjacent or suspicious mucosa.

BARIUM SWALLOW (fig 9)

Useful in indicating the extent of the lesion, the barium swallow test can also provide the extent of any luminal narrowing and any angulation of the axis of the esophagus.

COMPUTERIZED TOMOGRAPHIC SCAN OF CHEST AND ABDOMEN

This is the current standard to evaluate both the extent of local disease as well as to search for hepatic, pulmonary, nodal, and other metastases. A 64 slice CT scan and 256 slice CT scan comes in handy and most of the time dispels the need for barium studies

ENDOSCOPIC ULTRASOUND(fig 10)

EUS is currently the most reliable method available for clinical staging[15] of esophageal or esophagogastric carcinomas that do not have distant disease on CT scan. The accuracy of EUS for T staging ranges between 75% and 90%[16,17] . Given that the stage of the tumor affects the extent of resection, EUS is an important adjunct to preoperative planning. In one recent review, EUS was superior to CT scan for staging of esophageal cancer[18]. CT, however, remains superior to EUS for detecting distant lymph node metastases such as at the celiac axis [19]or the supraclavicular region[20].

POSITRON EMISSION TOMOGRAPHY (PET) (fig 11)

FDG PET is not an appropriate first-line diagnostic procedure in the detection of stomach cancer and is not helpful in tumor staging, it may play a valuable role in the detection of distant metastases, such as those of the liver, lungs, adrenal glands, ovaries, and skeleton. FDG PET may also be helpful in the follow-up of patients undergoing chemotherapy, as it allows the identification of early response to treatment

Finally, some have advocated the use of laparoscopy and laparoscopic ultrasonography to detect the presence of intra-abdominal metastases. In one recent series, laparoscopic ultrasound provided N- and M-staging that was superior to CT or EUS [21]. Adding these methods to conventional staging protocols avoids noncurative laparotomies in 11%–48% of patients with GI tumors [22]. This isespecially true for malignancies that can be palliated nonoperatively [21].

Fig 8 :EUS of the GE junction.

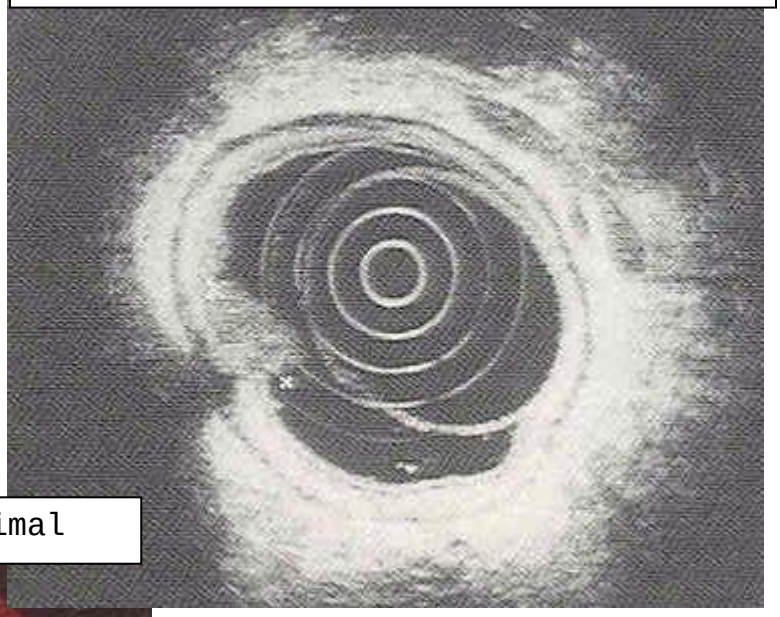


Fig 9 :Endoscopy showing Poximal

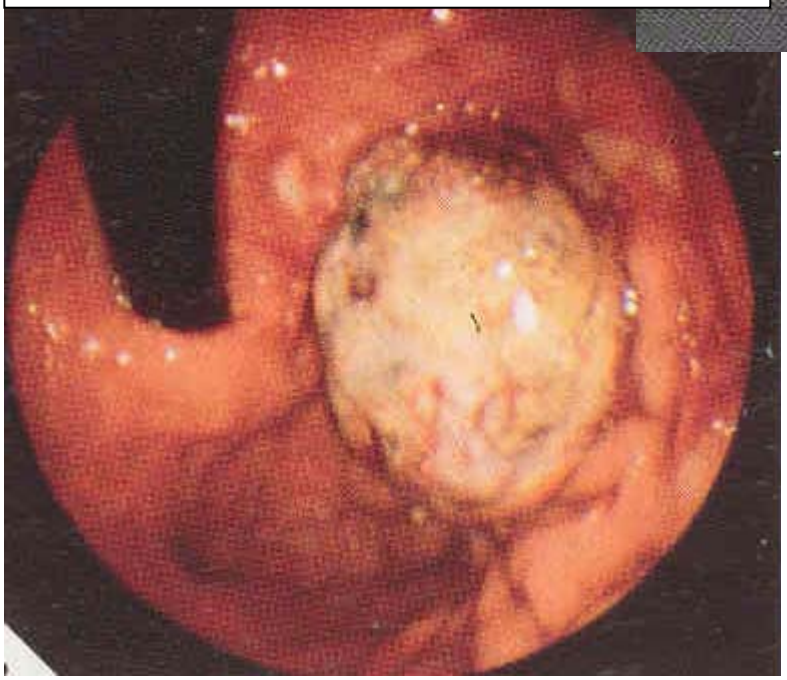


Fig 10 :Barium Swallow -

Fig : 11 Laparoscopy USG – liver

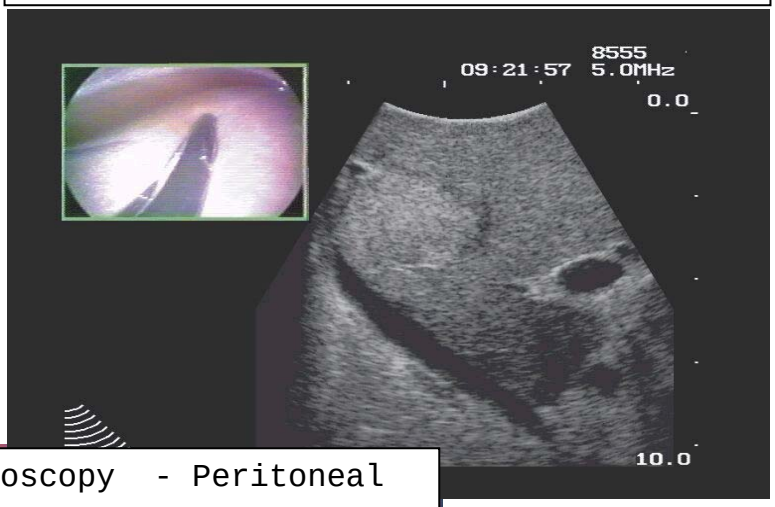


Fig 12: Diagnostic laparoscopy - Peritoneal

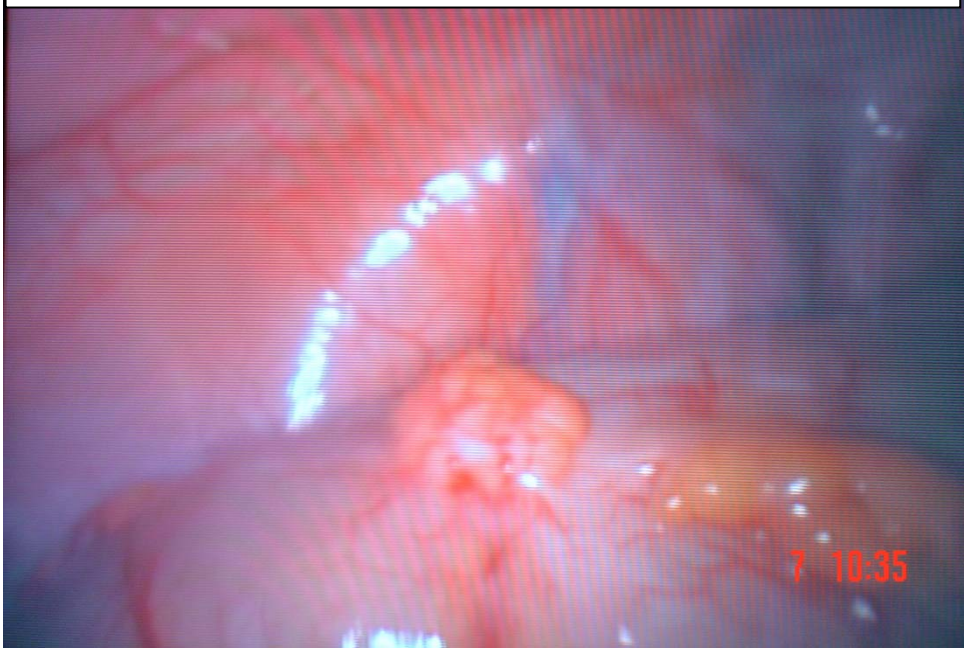
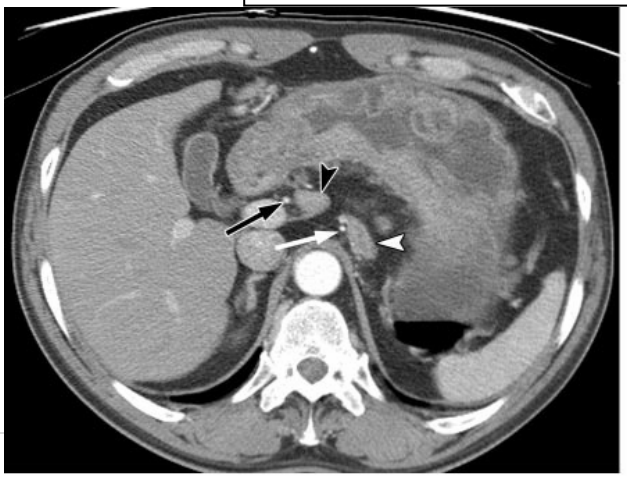
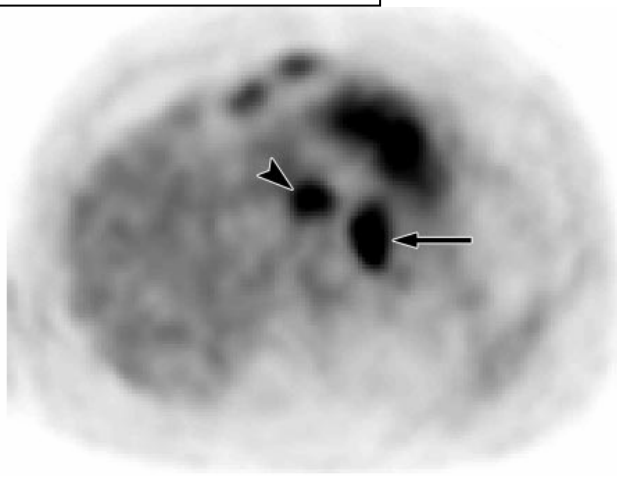


Fig 13 :PET – CT fusion imaging -





CLASSIFICATION

There has been longstanding confusion in both the classification and treatment of carcinomas arising in the area of the gastroesophageal junction. Whereas thoracic surgeons treated all esophagogastric tumors as esophageal in origin ,General /gastrointestinal (GI) surgeons approached them as gastric cancers. Furthermore, it seems that there was little attempt to differentiate tumors arising in the gastric cardia from esophageal tumors even though their origin and biologic behavior were different [13] Thus, in 1997, at the consensus conference of the International Gastric Cancer Association (IGCA) and the International Society for Diseases of the Esophagus (ISDE), it was agreed that a clear definition and classification of tumors arising near the esophagogastric junction was needed[14].

Siewert et al[14]. Developed the most widely adopted classification system for adenocarcinomas arising in the proximity of the esophagogastric junction. Gastroesophageal junction tumors are defined as being within 5 cm proximal and distal of the anatomic cardia.

They are further differentiated into three distinct tumor entities:

type I (adenocarcinoma of the distal esophagus arising from an area with specialized intestinal metaplasia of the esophagus and which may infiltrate the esophagogastric junction from above),

type II (true carcinoma of the cardia arising from the cardiac epithelium or short segments with intestinal metaplasia at the esophagogastric junction, “junctional carcinoma”),

type III (subcardial gastric carcinoma that infiltrates the esophagogastric junction and distal esophagus from below)[14].

Type I tumors are a distinct entity that should be treated as a distal esophageal cancer. Most of these tumors arise from areas of intestinal metaplasia in Barrett’s epithelium as a consequence of chronic gastroesophageal reflux. Increased surveillance programs have led to the diagnosis of these tumors at an earlier stage, and they can occasionally be managed by limited surgical or endoscopic treatment [9].In contrast, type III tumors represent Proximal gastric cancer and should be approached in accordance with gastric cancer guidelines[9] .The characterization of type II tumors, however, remains controversial. Most evidence suggests that these tumors behave more like proximal gastric tumors than distal esophageal adenocarcinomas . For example, in contrast to patients with type I tumors, only 10% of these patients have intestinal metaplasia in the distal esophagus. Furthermore, the lymphatic drainage pathways are such that type I tumors tend to drain more toward the mediastinal nodes, as well as to the celiac axis, whereas type II and type III tumors preferentially spread to the celiac axis nodes[9] .

2.6 TREATMENT

THERAPEUTIC OPTIONS

The four therapeutic options for carcinoma of the esophagogastric junction are surgery, radiotherapy, chemotherapy, or a combination of methods. In patients who are good candidates for surgery and in whom no distant organ metastasis has been identified (stages I and II), surgical resection provides the best chance for cure and the best palliation when cure is not possible[23]. Preoperative radiation is useful in stage III squamous cell carcinoma and may convert an unresectable lesion into a resectable one. Combined chemoradiotherapy has produced, in some studies, complete remission in 20% to 30% of patients. Typically, fluorouracil, cisplatin, and mitomycin-C or vincristine are given in combination with 2500 to 3000cGy external radiation directed at the lesion. This therapy may be given as the sole treatment or preoperatively.

There is debate whether patients with complete endoscopic disappearance of the tumor after chemoradiotherapy should be subjected to resection.

SURGICAL APPROACH

In patients with no evidence of distant metastases and who are fit for surgery, surgical resection is the mainstay of therapy for gastroesophageal junction tumors. A complete resection of the tumor and its entire lymphatic drainage offers the best hope for long-term survival[24]. Both tumor stage (particularly nodal involvement or N stage) and resection margins (R status) are significant prognostic factors. R status has been

the variable most consistently reported to be associated with prognosis and is also the variable most likely to be influenced by surgical technique .Achieving an R0 resection can be challenging due to the propensity of these tumors for intramural spread as well as their proximity to adjacent organs that cannot always be resected en bloc.

Type I tumors are generally treated by total esophagectomy to obtain adequate proximal margins and remove all mediastinal lymph nodes. The management of type II and III tumors, however, remains controversial .Numerous surgical approaches have been reported for type II tumors[8,12,24]. These include abdominothoracic en bloc esophagogastrectomy, subtotal esophagectomy with resection of the proximal stomach, total gastrectomy with transhiatal resection of the distal esophagus, and resection of the proximal stomach and distal esophagus with esophagogastrostomy[23].

Patient factors such as body habitus, prior surgery, and pulmonary function are important in selecting the appropriate surgical approach. Although each approach has its advantages and disadvantages, no option has demonstrated a clear survival benefit over the others provided that adequate margins are obtained and an adequate lymphadenectomy is performed. Bile reflux esophagitis can be a difficult problem to manage if reconstruction includes an intrathoracic phagogastrostomy, but complex reconstructions with colon or jejunal interpositions carry an even higher morbidity rate. Therefore, many surgeons attempt to place the esophagogastric anastomosis in either the abdomen or neck and use the gastric remnant as the conduit of choice [9,10,14,27,28].To ensure clear margins, intraoperative frozen sections should be used liberally However, even frozen section can lead to false-negative results. In a recent study by Ito et al.,a

recommendation was made to achieve a gross proximal resection margin length of at least 6 cm and a distal resection margin length of at least 4 cm, regardless of tumor location.

Surgical Technique[98]

*Transhiatal esophagectomy (fig 15)*without thoracotomy was developed because of the pulmonary and intrathoracic leak complications associated with the thoracotomy required for transthoracic and en bloc esophagectomies. For transhiatal esophagectomy, the entire thoracic esophagus is resected through a widened hiatus and reconstructed with the stomach anastomosed to the remaining cervical esophagus above the level of the clavicles .The overall in-hospital mortality for transhiatal esophagectomy is 5.7% versus 9.2% for transthoracic esophagectomy, with no significant difference in 3- and 5-year survival. Advocates of transhiatal esophagectomy report a low operative mortality of 2% to 8% and a low anastomotic leak rate of 5% to 7.9%. Orringer and coauthorsreviewed their 22-year experience with transhiatal esophagectomy in 1085 patients. They reported a hospital mortality rate of 4% and an average blood loss of less than 700 mL. Anastomotic leak occurred in 13% of patients. A modified technique of reconstituting the gastrointestinal tract by switching to a side-to-side stapled esophagogastric anastomosis has reduced the leak rate to less than 3%.

In performing a transhiatal esophagectomy, the surgeon removes accessible cervical, intrathoracic, and intra-abdominal lymph nodes for staging, but a complete en

bloc resection of adjacent lymph node-bearing tissue is not accomplished. The advantages of this approach include

(1) a thoracotomy is avoided;

(2) an intrathoracic esophageal anastomosis is avoided (if a cervical esophagogastric anastomotic leak does occur, it is easily drained and rarely causes mediastinitis or fatal complications); and (3) no intra-abdominal or intrathoracic gastrointestinal suture lines are present.

The transhiatal esophagectomy is performed through an upper-midline abdominal and cervical incision without thoracotomy; therefore, the thoracic esophagus is resected through the widened diaphragmatic hiatus and the neck. The stomach is mobilized by dividing the left gastric and left gastroepiploic vessels, and the right gastric and the right gastroepiploic arcades are preserved. Pyloromyotomy and feeding jejunostomy are performed routinely.

The entire thoracic esophagus from the level of the clavicles to the cardia is resected, while one carefully monitors intra-arterial blood pressure to avoid prolonged hypotension from cardiac displacement during the transhiatal esophageal dissection.

The surgical stapler is used to fashion a gastric tube from the greater curvature of the stomach while still preserving the entire length. The stomach is mobilized through the posterior mediastinum in the original esophageal bed and is anastomosed (hand sewn or stapled) to the cervical esophagus. The normal stomach, properly mobilized, reaches to the neck in everypatient. For distal-third esophageal tumors localized to the

cardia, the high lesser curvature of the stomach is resected 4 to 6 cm beyond the gross tumor, while preserving the point on the high greater curvature

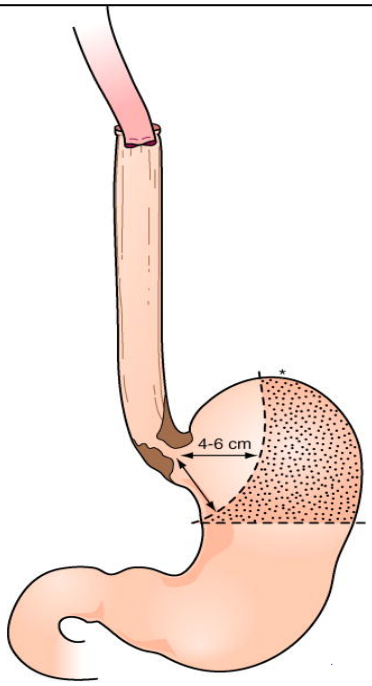
LYMPHADENECTOMY

More than two thirds of patients with esophageal and gastric cancers will have lymph node metastases at the time of surgery [29]. As stated previously, nodal status is nearly as important as R status in determining prognosis and treatment for tumors of the gastroesophageal junction. Lymphadenectomy(fig 16) improves the accuracy of pathologic staging in both gastric and esophageal cancers and provides locoregional control[30-32] . The optimal extent of a lymphadenectomy and its impact on survival are extremely controversial.

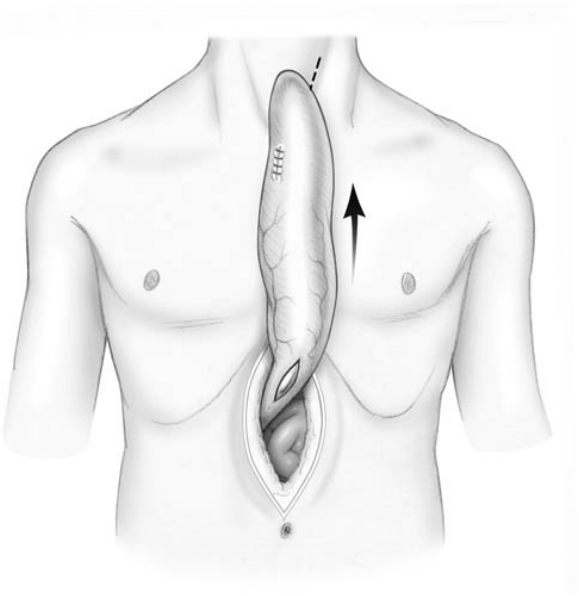
In a study by Karpeh et al.[33] , patients with stage II and III gastric cancer who had fewer than 15 lymph nodes examined had significantly lower 5-year survival rates. This finding was confirmed in other studies[24,34]. Thus, sampling of at least 15 lymph nodes and preferably 20–25 lymph nodes is necessary for accurate staging[35].

In 2002, de Manzoni et al[8]. found that stage pN2 and pN3 were grave prognostic indicators. In this study, multivariate analysis revealed that the pT category was less important than the N category; univariate analysis revealed that survival greater than 3 years was restricted to pN0 and pN1 subgroups, regardless of the pT status. The authors subsequently concluded that chances for cure are limited to pN0 and pN1 patients[8].

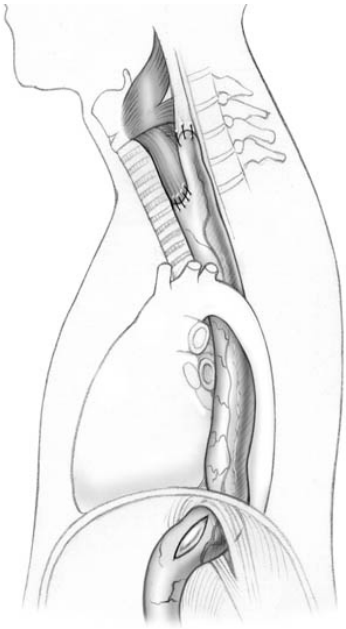
Fig 15 Trans Hiatal Esophagectomy



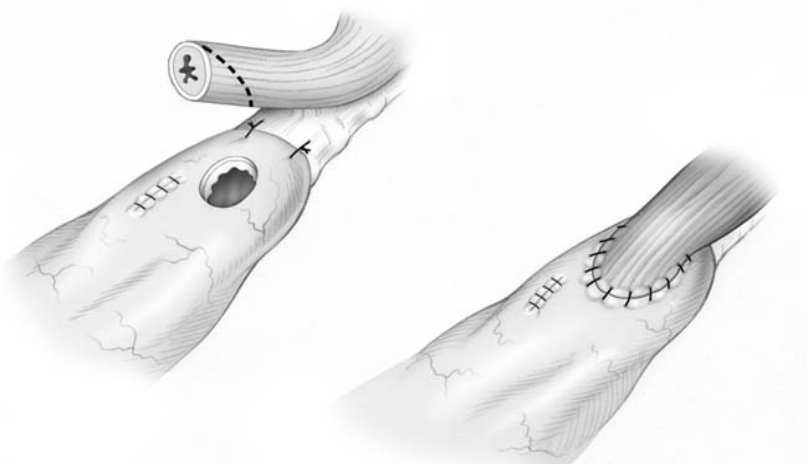
A. Extent of



B. Creation Of Gastric Tube



C. Conduit



D. Esophagogastric Anastomosis

There are generally two types of lymphadenectomies (fig 16)performed *fo*r gastric cancers. A D1 dissection refers to the removal of the stomach and lesser and greater omentum with associated N1 lymph nodes (station 1–6 lymph nodes) [36]; A D2 dissection involves a more extensive gastrectomy with removal of N2 lymph node and typically includes a splenectomy and distal pancreatectomy[30]. A final category, the D3 dissection, would include nodes within the porta hepatis and periaortic regions.

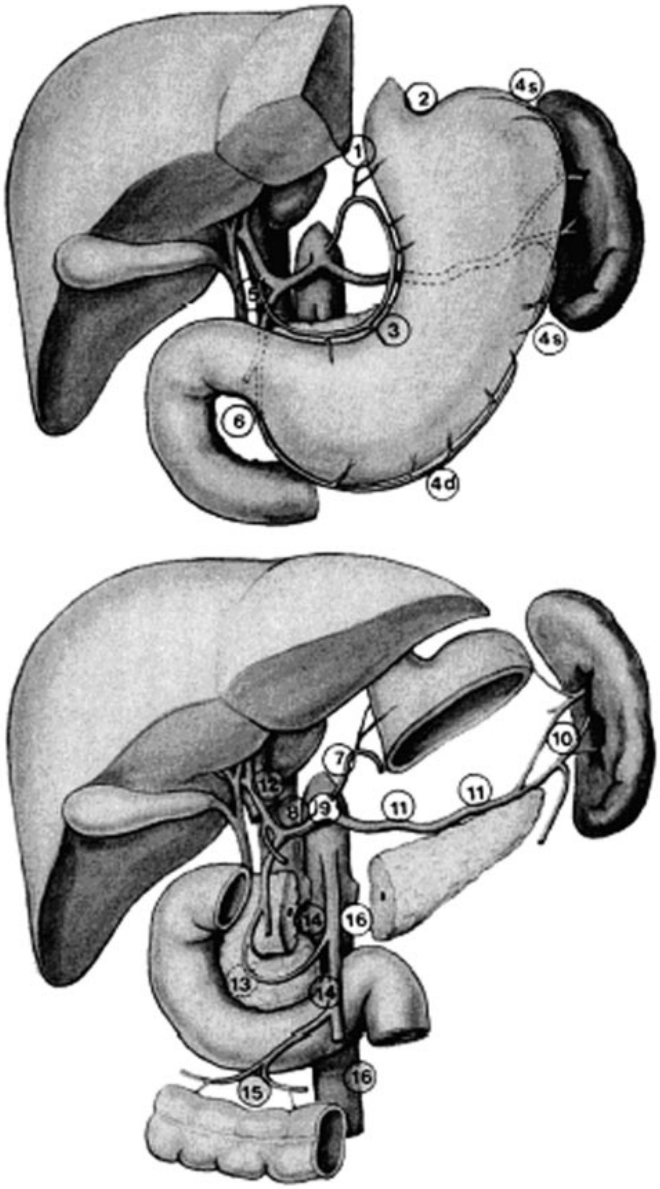
Recent studies [40,41,42,44]have shown that a more extensive lymphadenectomy has not been proven to confer a survival benefit, this study questions the assertion that a D2 dissection results in more complications than does a D1 resection.

There is currently not enough evidence to support performing extended lymphadenectomies in all patients with tumors at the gastroesophageal junction[30] . However, extended lymphadenectomy may improve the prognosis of a subgroup of patients with gastric or esophageal cancer who have a limited number of positive lymph nodes. In addition, despite the fact that D2 lymphadenectomy has not been shown to be superior, it does seem to have the advantage of more accurate pathologic staging. As a result, some major cancer centers still perform a D2 resection, as supported by the National Comprehensive Cancer Network treatment guidelines .

Finally, current research on sentinel node technology may eventually help to eliminate the lymphadenectomy controversy [50 - 52].However, the utility and feasibility of thistreatment modality remain to be determined.

Fig. 16 : Gastric cancer lymph node stations

Lymph node stations surrounding the stomach:



1, right cardial nodes;

2, left cardial nodes;

3, nodes along the lesser curvature;

4, nodes along the greater curvature;

5, suprapyloric nodes;

6, infrapyloric nodes;

7, nodes along the left gastric artery;

8, nodes along the common hepatic artery;

9, nodes around the celiac axis;

10, nodes at the splenic hilus;

11, nodes along the splenic artery;

12, nodes in the hepatoduodenal ligament;

13, nodes at the posterior aspect of the pancreas hea

14, nodes at the root of the mesentery;

15, nodes in the mesocolon of the transverse colon;

16, para-aortic nodes.

2.7 NEOADJUVANT THERAPY

Since carcinomas of the gastroesophageal junction often present at an advanced stage, neoadjuvant therapy has many theoretical benefits. Neoadjuvant therapy may reduce the size of the tumor, thereby improving chances of an R0 resection; treat micrometastases; and allow accurate assessment of the completeness of pathologic response, all of which may influence decisions on postoperative treatment[53]. In addition, certain chemotherapeutic agents may have radiosensitizing properties [54],and the increased oxygenation of undisturbed tissue in the tumor bed also enhances the effects of preoperative radiation therapy [30].However, there is substantial morbidity associated with these regimens. Thus, the ISDE/IGCA consensus conference recommended that neoadjuvant therapy be restricted to patients with locally advanced tumors of the esophagogastric junction where an R0 resection is questionable.

Many phase II trials have investigated neoadjuvant combination therapy using a variety of regimens in patients with both resectable and nonresectable disease[55-58]. These trials generally show that neoadjuvant chemotherapy produces extended disease-free and overall survival compared with historical controls. It has been found that neoadjuvant therapy with a cisplatin-based polychemotherapy regimen followed by surgical resection markedly improves survival .Combination therapy clearly leads to improved response rates relative to monotherapy.

Some of the original neoadjuvant trials employed fluorouracil,doxorubicin, and mitomycin and fluorouracil, doxorubicin, and high-dose methotrexate (FAMTX)[60] . Other

randomized control studies have confirmed that FAMTX should be the reference treatment [61].

Chemoradiotherapy [65]plus surgery significantly reduced the 3-year mortality rate compared with surgery alone. In addition, preoperative chemoradiotherapy downstaged tumors as evidenced by pathologic analysis of resected specimens. Similar to Kaklamanos et al. these authors found that the risk for postoperative mortality was higher in the group who had neoadjuvant chemoradiotherapy.

Multimodality neoadjuvant therapy should beconsidered in patients with large tumors confined to the esophagus and draining lymph nodes[67,68] (i.e., clinical or EUS T stage _2 or N stage _0) if the patient is a candidate for surgical resection . However, although the evidence is promising, it is important to note that one of the reasons neoadjuvant therapy may increase survival is that it compensates for inadequate surgical resections[70-72].

It is imperative that surgeons strive to attain an R0 resection with at least a D1 lymphadenectomy in patients with resectable disease regardless of whether they had preoperative chemoradiotherapy.

Clearly, more research is needed before there is a definitive stance on the use of neoadjuvant therapy for resectable tumors of the gastroesophageal junction[83-84]. The results of these clinical trials and other studies will hopefully offer improved options in the management of gastroesophageal cancer.

ADJUVANT THERAPY

A successful surgical resection does not always indicate complete cure. In a review of 50,169 patients in the U.S. who underwent gastrectomy between 1985 and 1996 [85], patients with stage IA disease (tumor confined to the gastric mucosa) had a 65% 10-year survival rate. However, patients with more advanced disease had a considerably lower 10-year survival rate, ranging from 3% to 42% [85]. These rates highlight the importance of considering adjuvant treatment in patients with advanced stages of gastroesophageal cancer.

Much evidence now supports the use of chemotherapy to improve outcome in patients found to have advanced disease at the time of surgery. Even after gastric resection with curative intent, there remains a 40%–65% chance of local or regional recurrence in the gastric remnant or tumor bed, anastomosis, or regional lymph nodes[86-89] .

Therefore, locally directed adjuvant therapy plays an important role in patients with tumors of the esophagogastric junction[85] .Older studies did not show a survival benefit when comparing adjuvant chemotherapy with surgery alone[90,91] .Incontrast, a survival benefit was demonstrated when adjuvant therapy consisted of postoperative radiation with or without concomitant fluorouracil[92].

The U.S. Intergroup 0116 study was started in 1991 to examine the possible benefit of postoperative adjuvant multimodality treatment using radiotherapy and leucovorinmodulated fluorouracil[47] .After potentially curative resection of gastric cancer,

556 patients were randomly assigned to observation or adjuvant chemoradiotherapy. Approximately 20% of these patients had lesions present in the gastroesophageal junction. Three-year overall and diseasefree survival were significantly better for patients in the latter group (52% vs. 41%, respectively, and 49% vs. 32%, respectively) showed that the degree of survival benefit for patients with adjuvant therapy was identical for both gastric and gastroesophageal junction carcinomas[47].

As with rectal and pancreatic cancers, postoperative multimodal therapy consisting of regional radiation plus systemic chemotherapy seems to reduce relapse risk and prolong survival in patients with tumors of the stomach or esophagogastric junction and should thus be considered in high-risk patients [30]. Given the results of the Intergroup 0116 study, postoperative chemoradiotherapy is slowly emerging as the standard of care in treating gastric cancer.

Future areas of research need to evaluate new chemotherapeutic agents and improved modalities of radiation delivery and identify molecular markers that may indicate patients who are more likely to benefit from adjuvant therapy.

PALLIATIVE SURGERY

To palliate dysphagia, prevent aspiration, and improve quality of life, various endoscopic treatment modalities have been used. These include stents or laser therapy for those patients who present at an advanced stage, have poor general physical health, or both, and who cannot withstanda palliative operation[41] .Mean survival after these approaches has been around 140 days[93] .Unfortunately, these modalities are

occasionally ineffective. In such cases, consideration should be given to feeding tube placement or, in rare instances, palliative surgical resection in patients who are otherwise fit.

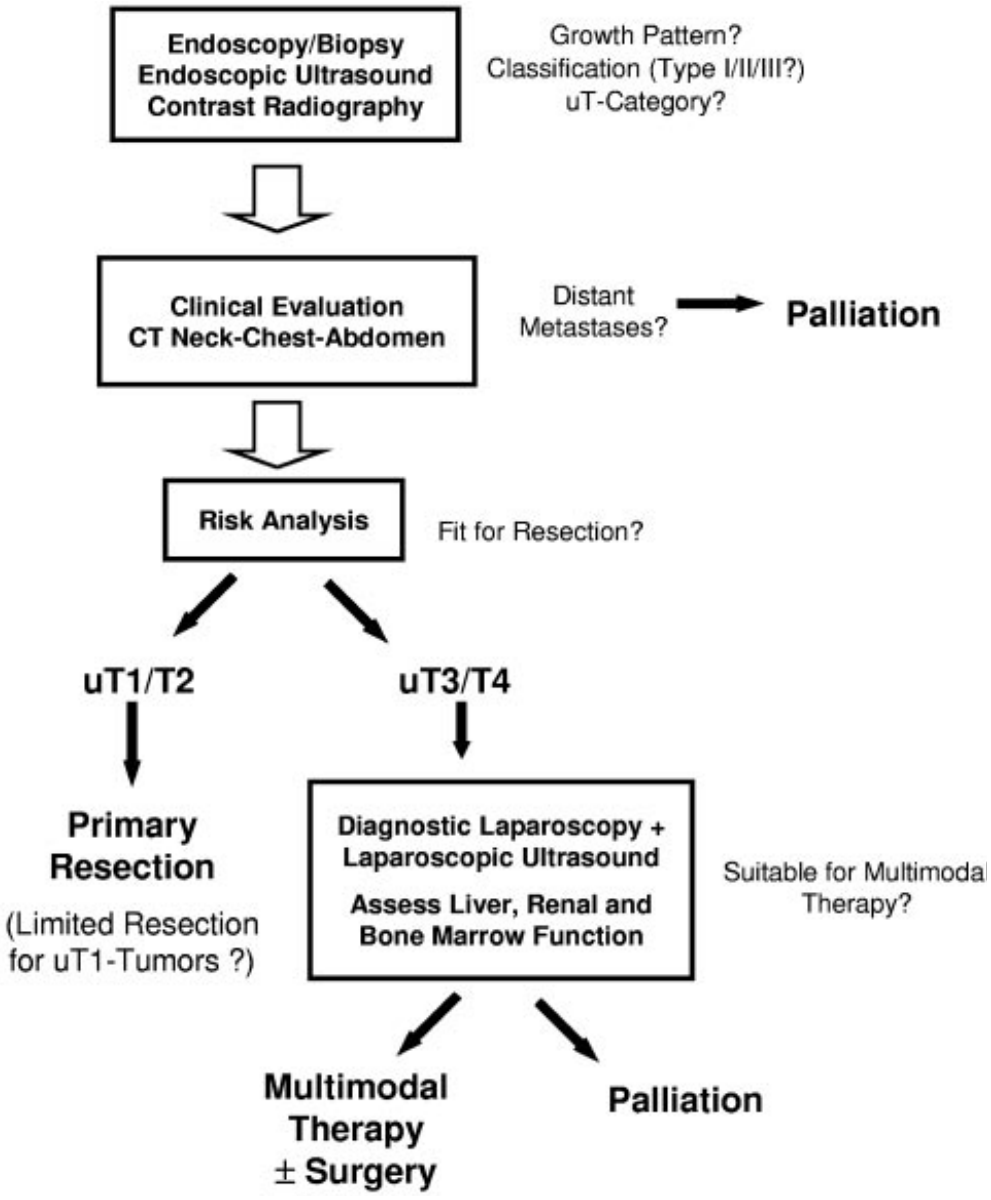


Fig 14 : Diagnostic Algorithm for GE

Study

AIM OF THE STUDY

On the basis of Siewart's classification we present our single institution experience in consecutive patients with AEG tumors over a 3 year period.This study is an audit of GE junction adenocarcinomas

Three current questions are addressed:

* Is there a difference between the three types of AEG tumors in respect to surgical epidemiology

* Analysis of surgical treatment strategies based on tumor type?

* Analysis of immediate post op morbidity between the AEG subgroups?

STUDY DETAILS

Type of study: Prospective study

N : 46

M : F : 29 male : 17 female

Period of Study: June 2005 to August 2007

Institution \Departments: Department of Surgical Gastroenterology and General Surgery, Government Royapettah Hospital attached to Kilpauk Medical College

Type of Analysis Done: Clinical Data Analysis

Inclusion:

All patients diagnosed with

1. GE junction tumors
2. Preoperative staging shows operability.
3. Surgery done with curative intent

Exclusion:

1. Patients with systemic metastases on preoperative staging
2. Poor general status precluding an extensive surgical procedure
3. Patients with Squamous cell carcinoma of the lower esophagus
4. Patients not willing for surgery.

Limitations:

1. Staging methods were inadequate to decide treatment preoperatively in some cases.
2. Survival rates based on type of tumor and treatment strategy could not be assessed due to short duration of study.
3. Due to the limited number of cases in the study statistical analysis could not be done

The cases were studied from the time of admission to discharge and followed up in the outpatient department . All details are meticulously recorded after review in the case sheets. Any treatment approach contemplated or excluded was duly recorded.

All variables pertaining to the patient's details, presentation, investigations and treatment were recorded in preformed worksheet to ensure uniformity in recording and to eliminate any bias.

All information was recorded in a master chart so as to enable early comparison and for critical analysis. The details of the patient and the procedure are given in the master chart.

MANAGEMENT PROTOCOL

1. Clinical evaluation
2. Investigations
    a. Invasive and Non invasive
    b. USG abdomen and Pelvis
    c. UGI scopy with biopsy
    d. CECT abdomen and thorax
3. Assessment of Co – morbid illnesses
4. Preoperative staging
5. Treatment modality decided based on Stage of the disease and the physical status of the patient.
6. Surgical approach based on the topographical location of the tumor and the feasibility of resection
7. Complications during immediate post operative period
8. Follow up in the out- patient department and during re-admissions
9. post operative adjuvant RT or CT given

MODE OF PRESENTATION

Patients with Ca GE junction presented with the following symptoms

The patients usually presented with

1. History of GERD symptoms
2. Hematemesis / malena
3. Unexplained Loss of weight

4. Mild dysphagia, rare odynophagia
5. Retrosternal pain
6. Epigastric pain
7. Asymptomatic but with h\o tobacco or alcohol use

For referred patients, the presenting complaint to their primary physician and the duration were taken into account . The mean duration of symptoms were then recorded.

EVALUATION

Almost 50% of the cases are referrals from District Hospitals and Department of Medical gastroenterology.

The evaluation process begins with a full clinical history and a complete physical examination. A thorough assessment of associated comorbid illness is done.

The assignment to each of the Siewart's sub types is purely morphological/ topographical and was in all patients performed based on a combination of

a. contrast radiogram,
b. endoscopy with orthograde and retroflexed view of the esophagogastric junction
c. computer tomography,

OGD is the diagnostic modality of choice. It gives the intraluminal extent of the tumor and provides a biopsy for histopathological confirmation.

Staging and Metastasis screen is done using CECT abdomen and Thorax and USG abdomen.

Preoperative Stage of disease then determines the treatment modality.

The performance status of the patient is then assessed as it a good indicator of surgical outcome and post operative morbidity and mortality.

In the outpatient setup, a majority of patients with advanced inoperable lesions and those who were poor candidates for surgery were referred for palliative care and are not included in the study.

Surgical treatment is directed at a reasonably good cure and palliative loco-regional control. Symptom control and palliation are the real therapeutic goals for nonsurgical measures.

PREOPERATIVE OPTIMISATION

In the preoperative setting, proper patient optimsation influences mortality and morbidity after major surgery. Therapy consisted of

- Improving patient nutrition through enteral and parenteral routes
- Careful monitoring and correction of co morbid conditions which have adverse surgical outcomes like diabetes and hypertension

- Any major esophageal surgery requires adequate pulmonary function. Physiotherapy and pharmacotherapy were used as required to achieve an optimal PFT.

PATHOLOGY

The criteria used for histopathological analysis of preoperative endoscopic biopsy and postoperative resected specimens were

Macroscopic appearance

- Location of tumor
- Macroscopic appearance

  Polypoidal, ulcerative and elevated lesion
- Maximum size of tumor

Microscopic features

- Degree of tumor differentiation
- Associated Barett's metaplasia

SURGICAL TREATMENT STRATEGIES

Surgical treatment strategies based on tumor type allow a differentiated approach and result in survival rates superior to those reported with other approaches. The choice of the surgical approach was based on the tumor location (AEG Type I, II, or III) with the aim to achieve a complete macroscopic and microscopic tumor resection.

In general a transhiatal esophagectomy with or without resection of the proximal stomach was the procedure of choice in patients with Type I tumors.

A partial gastrectomy with transhiatal resection of the distal esophagus was the preferred approach in patients with Type III tumors.

Similarly, in patients with Type II tumors an attempt was made to achieve a complete tumor resection via partial gastrectomy with transhiatal resection of the esophagus.

In general a proximal clearance of 2 cm and a distal clearance of 5 cm has been followed. The extent of gastrectomy (Total vs partial) is a controversy.

A neck anastomosis was preferred over an intra- thoracic one . This avoids intrathoracic complications of a leak.

Due to the advanced presentation of these tumors T3 and T4, prognostic staging and locoregional control by lymphadenectomy was avoided due to high incidence of nodal positivity , clearance affords little benefit in terms of survival.

POSTOPERATIVE COURSE

Post operative morbidity and mortality in the immediate 30 days were analyzed.

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Analysis

ANALYSIS OF THE STUDY

AGE INCIDENCE (chart 1)

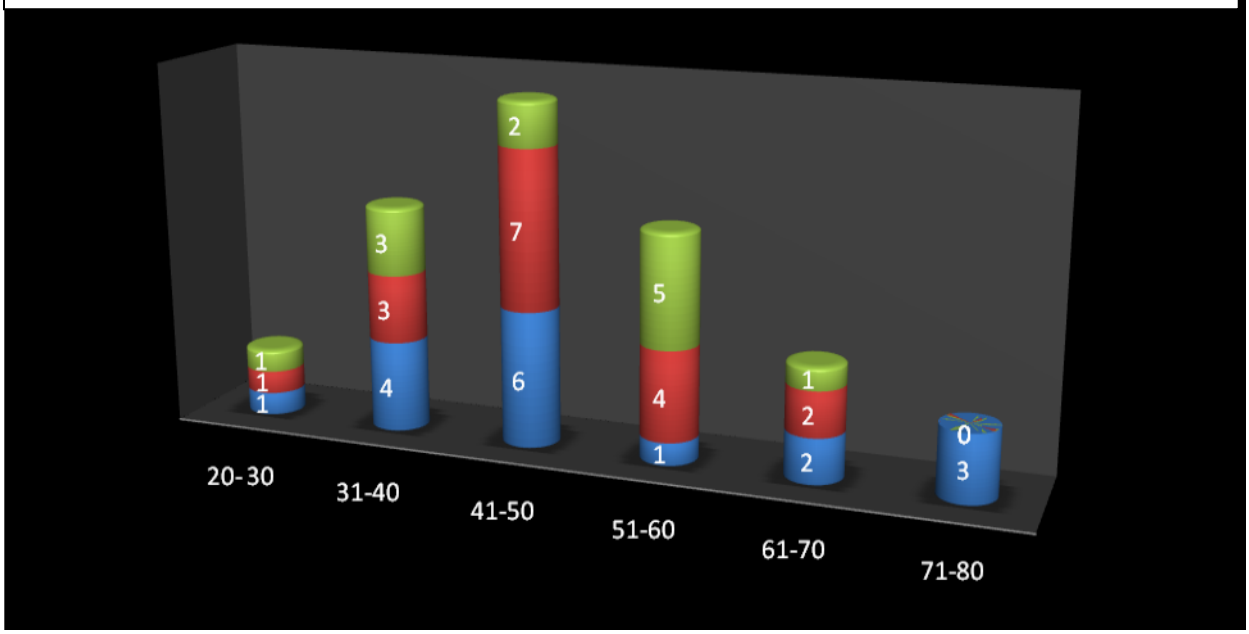
AGE	I	II	III	Total	Percentage
20- 30	1	1	1	3	6.50
31-40	4	3	3	10	21.74
41-50	6	7	2	15	32.61
51-60	1	4	5	10	21.74
61-70	2	2	1	5	10.87
71-80	3	0	0	3	6.52
TOTAL					100

The cases recorded in this study are between 26 and 75 years of age. Only 3 cases aged less than 30 and 3 cases aged more than 70 years. The age incidence noted in females is comparatively earlier compared to males (table 3). The age incidence correlates with the literature. Highest incidence is noted in the 40 – 60 years of age.

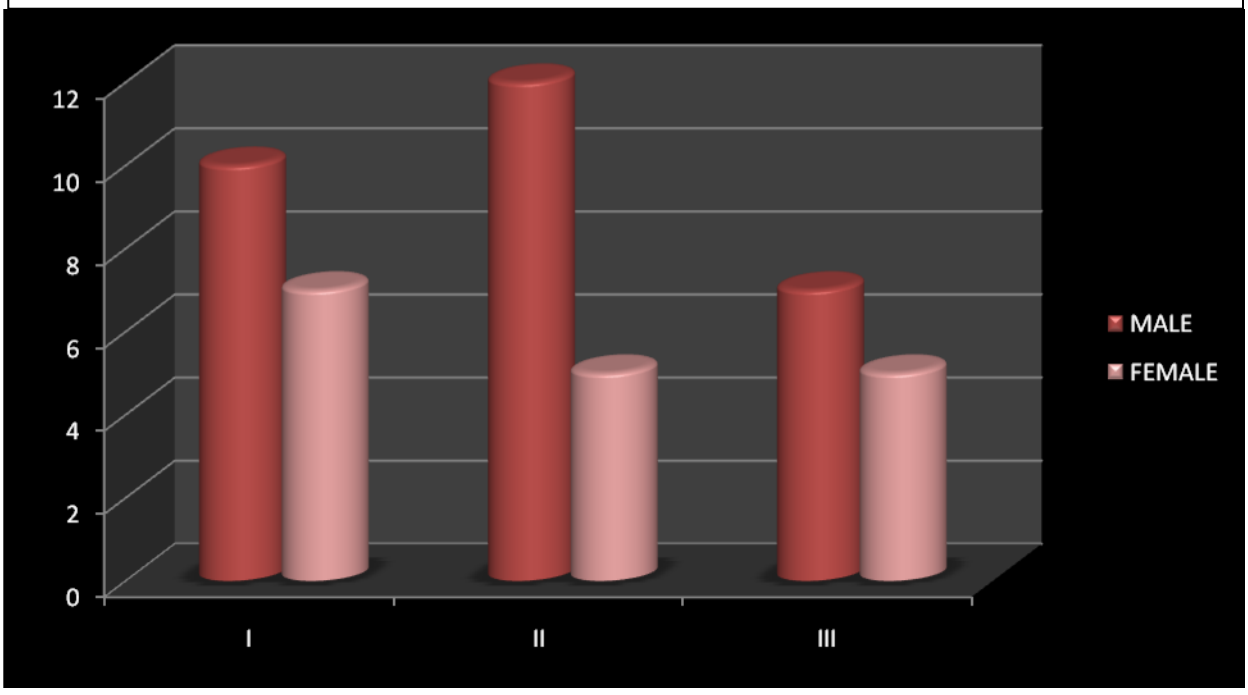
Mean age of presentation (years ± SD)

- TYPE I – 48.5
- TYPE II – 46.9
- TYPE III – 49 .7

AGE INCIDENCE chart 1



SEX INCIDENCE chart 2



SEX INCIDENCE (chart 2)

SEX	I	II	III	TOTAL NO. OF CASES	PERCENTAGE
MALE	10	12	7	29	63.04
FEMALE	7	5	5	17	36.96
TOTAL	17	17	12	46	100

In Type II tumors there is strong predominance of the male sex. Among the studied cases, increased incidence is found in males which correlates with the literature. Here the ratio of incidence between the male and female is 1.7:. 1

Male: Female ratio:

- TYPE I - 1.4: 1
- TYPE II – 1.7: 1
- TYPE III – 1.4: 1

AGE	Male	Female	TOTAL
20- 30	2	1	3
31-40	5	5	10
41-50	8	7	15
51-60	8	2	10
61-70	3	2	53
71-80	3	-	3

There is an earlier incidence of cancer in the female when compared with the male. The peak incidence in females is between 35 and 45 years whereas in the male it is between 40 – 50 years.

Adenocarcinoma of the Esophagogastric Junction Results of Surgical Therapy Based on Anatomical/Topographic Classification in 1,002 Consecutive Patients

J. Ru¨diger Siewert, MD, FACS(Hon), FRCS, FASA,* Marcus Feith, MD,* M. Werner, and Hubert J. Stein, MD*

	I	II	III	Total
Age (mean)	60.1	60.4	62.6	61
M:F	9.0:1	5.4:1	2.1:1	3.9:1
Prevalence of G3	51	55.4	71.6	60.2

Compared with a siewart et al trial published in ANNALS OF SURGERY Vol. 232, No. 3, 353–361 © 2000

1. The incidence of AEG tumors occurs a decade earlier in our study.
2. The incidence is higher in females

PREDISPOSING FACTORS (chart 3)

Risk factors	I	Ii	III	Total no of cases	Percentage
Smoking	4	7	1	12	26.09
Alcohol	7	6	6	19	41.30
Gord	0	4	2	6	13.04
Malnutrition	3	0	2	5	10.87
Others	1	0	1	2	4.35
Nil	3	4	3	10	21.74
Total					100

Among the cases studied smoking (26%) and alcohol (41%) form the major predisposing factors. GERD (13%) forms an important factor in type II and III growths (chart4). There is a significant proportion of patients with no risk factors (21 percent).

MODES OF PRESENTATION

SYMPTOMS	I	II	III	TOTAL	PERCENTAGE
History of GERD symptoms	0	4	2	6	13.4
Hematemesis/melena	3	0	1	4	8.67
Retrosternal pain	4	2	3	9	19.56

No symptoms	2	4	5	11	23.91
Epigastric pain	4	1	0	5	10.87
Dysphagia	2	3	1	6	13.04
Weight loss	4	1	0	5	13.04

The most common presenting symptoms are reflux (13.4%), retrosternal pain (19.56%). Twenty three percent of patients presented with no symptoms referred to the GE junction. None of the patients presented as emergencies.

At presentation, at least 30% of the patients will have an incurable disease, and 30% will be excluded from radical surgery for various reasons.

SYMPTOMS	TOTAL	Operable	Inoperable	Ratio
History of GERD symptoms	6	4	2	0.5
Hematemesismalena	4	3	1	0.33
Retrosternal pain	9	5	4	0.8
No symptoms	11	9	2	0.22
Epigastric pain	5	4	1	0.25
Dysphagia	6	4	2	0.5
Weight loss	5	4	1	0.25

Patients who were asymptomatic at presentation had the lowest incidence of inoperability whereas patients with retrosternal pain had highest incidence of inoperability (note that all patients were deemed operable on conventional imaging before surgery was planned).

COMORBID CONDITIONS and OPTIMISATION

As the incidence of GE junction tumors is higher in the elderly age group, the co existence of age related diseases is high. The preexisting disease together with the tumor related complications cause a delay in the preoperative optimization and postoperative recovery. Patients with ASA 3 and above were considered unfit for surgery. The most common comorbid condition encountered was diabetes and cardiac disease. Optimisation resulted in greater pre and post op stay periods in the hospital

Chart 3: RISK FACTORS

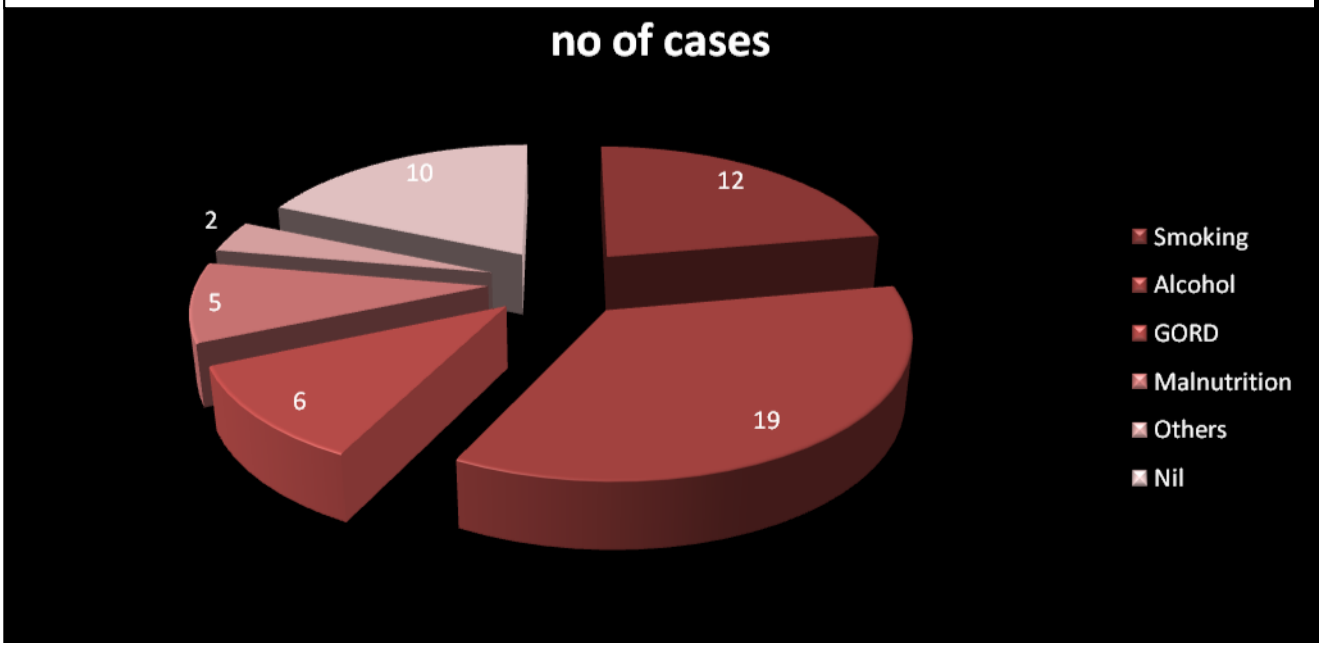
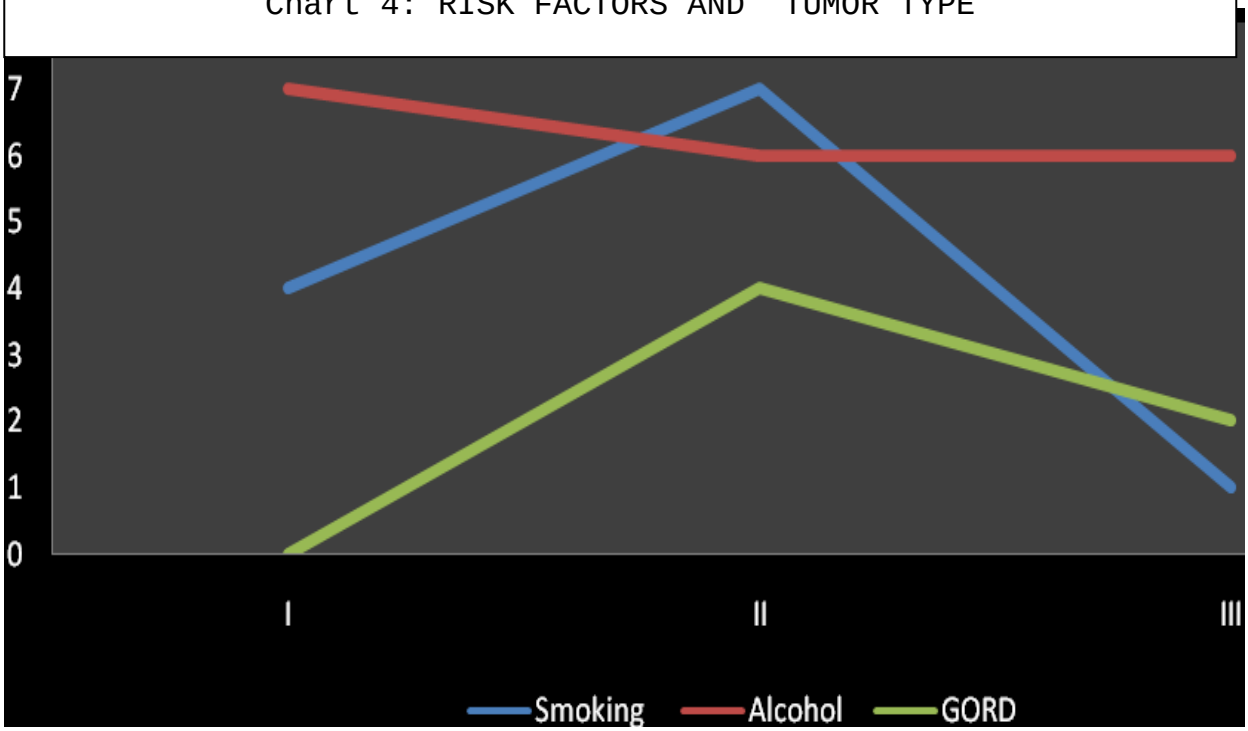


Chart 4: RISK FACTORS AND TUMOR TYPE



	No of CASES	Investigations	Treatment givens	Percentage of total patients
NUTRITION	4	BMI Albumin	Feeding jejunostomy Maximise oral intake Acute special diet*	9%
Cardiac disease	8	ECHO	As directed by physician	17.4%
Diabetes mellitus	8	Serial blood glucose measurements	As directed by physician	17.4%
Poor pulmonary function	5	PFT	Chest Physio-therapy Bronchodilators Stop smoking	10.9%

*The Acute special diet of GRH: 1 L of milk and 6 eggs.

LOCATION (chart 5)

Location	No of cases	Percentage
I	17	36.96
II	17	36.96
III	12	26.08

The incidence of distal esophageal cancer and true cardia cancer were equal in the study group (36%).There was lower incidence of these tumors in the proximal stomach (26%).

chart 4 :PRESENTING SYMPTOMS AND TUMOR TYPE

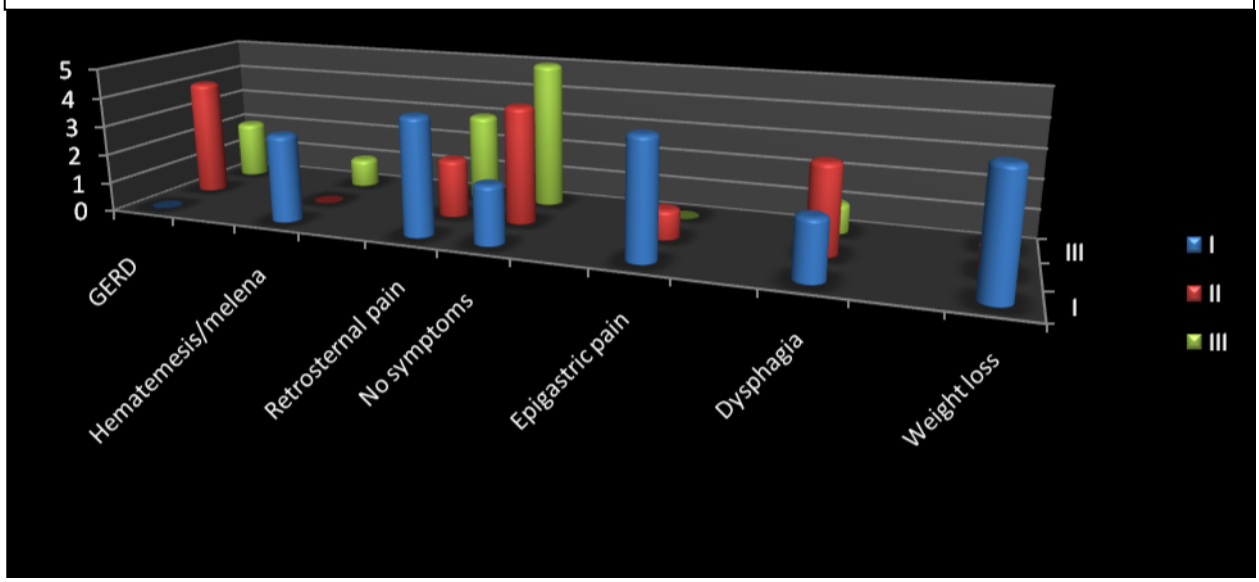
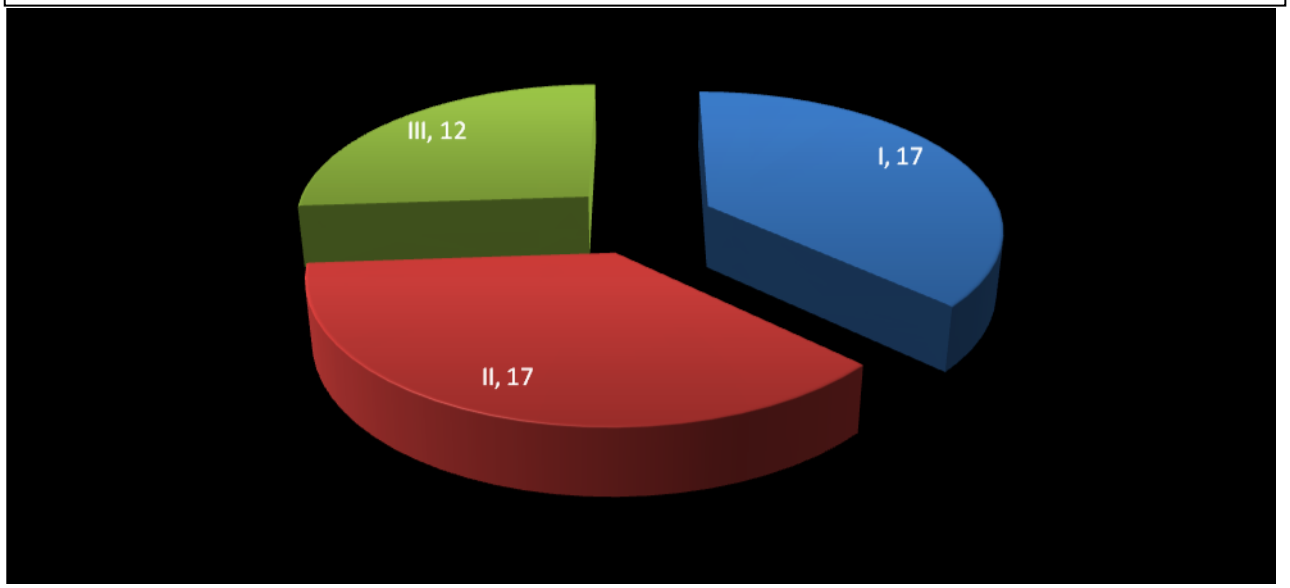


chart 5 :SIEWART'S TUMOR TYPE



HISTOPATHOLOGY

HISTOPATHOLGY	I	II	III	Total	Percentage
Adenocarcinoma	17	17	12	46	100
Dyplasia	-	-	-		-
Barett's esophagus (coexisting)	2	2	-	4	8.7
GRADE (chart 6)					
G1	11	4	3	18	39.13
G2	4	9	5	17	36.96
G3	2	4	4	11	23.91
Resected margins					
Positive	1	-	1	2	6.0%
Negative	9	11	8	28	87.5%

ENDOSCOPY (chart 7)

	I	II	III	TOTAL	%
Ulceration	6	3	2	11	23.91
Polypoid mass	10	11	8	29	63.04
Sligthly Elevated lesion	1	3	2	6	13.05

All resection specimen were assessed by an experienced pathologist. Staging is reported according to the most recent 2002 version of the UICC/AJCC guidelines.

In 8 % of the patients it was possible to show the presence of intestinal metaplasia (Barrett's esophagus) adjacent to the tumor. In patients with advanced tumors an accompanying Barrett mucosa could in some instances not be documented. Most type I tumors showed a so-called intestinal growth pattern. In contrast, Barrett's mucosa could not be demonstrated in Type III tumors, while 66% Type III tumors had a diffuse growth pattern and 30% were undifferentiated (G3 category) .This is of surgical interest regarding the extent of resection.

Most of the lesions were polypoidal in gross morphology (63%). Ulcerated (23%) and elevated (13.1%) lesions accounted for the remaining.

The prevalence of undifferentiated tumors, and growth pattern shows more similarities between Type II and III tumors than between Type II and I tumors.

An association between Barrett mucosa and Type I and II cancers could not be proven in the vast majority of patients due to the extensive nature of the lesions.

Esophageal tumors spread directly in longitudinal (oral/aboral) and radial directions. Positive resection margins resulting from longitudinal spread have been found in 6.0 % of resected specimens .

Chart 6: MACROSCOPIC APPEARANCE

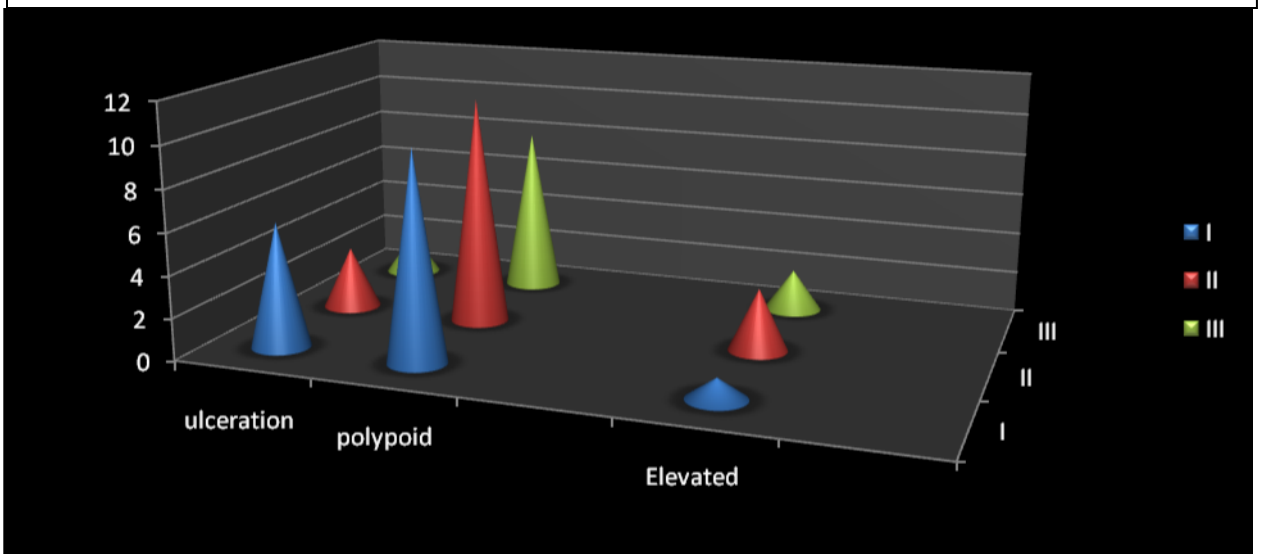
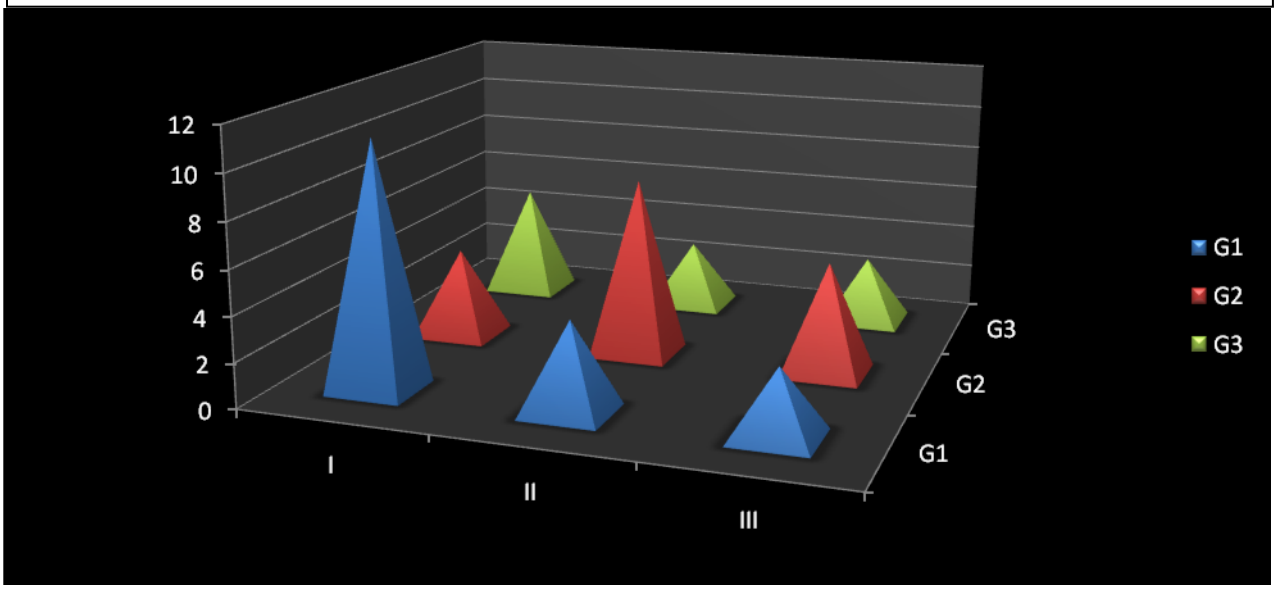


Chart 7: GRADE OF TUMOR



SURGERY

Resection	Reconstruction	I	II	III	TOTAL
Total gastrectomy + distal esophagectorny	Roux-en-Y esophagojejunostomy	0	1	2	2
Proximal gastrectomy + subtotal esophagectomy	Gastric tube + esophagogastrostomy	1	10	6	17
Subtotal esophagectomy (transhiatal)	Gastric tube + esophagogastrostomy	12	1	0	13
Laparotomy	Diagnostic	4	5	4	13
Palliative bypass		1	0	0	1
TOTAL					46

Adenocarcinoma of the EsophagogastricJunction Results of Surgical Therapy Based on Anatomical/Topographic Classification in 1,002 Consecutive Patients

J. Ru¨ diger Siewert, MD, FACS(Hon), FRCS, FASA,* Marcus Feith, MD,* M. Werner, and Hubert J. Stein, MD* ANNALS OF SURGERY Vol. 232, No. 3, 353–361 © 2000

Resection	I	II	III	TOTAL
Transthoracic Esophagectomy	66	5	1	72
Transmediastinal Esophagectomy	266	43	6	315
Extended gastrectomy	29	223	363	615

Surgical treatment strategies (chart 8) based on tumor type allow a differentiated approach and result in survival rates superior to those reported with other approaches. The choice of the surgical approach was based on the tumor location (AEG Type I, II, or III) with the aim to achieve a complete macroscopic and microscopic tumor resection.

In general a radical transhiatal subtotal esophagectomy or en bloc esophagectomy with resection of the proximal stomach was the procedure of choice in patients with Type I tumors. Combined abdomino-thoracic approach was done in a single case due to difficulty in mobilizing the tumor. Unresectability of the lesion was found in 23% of tumors.

A Partial gastrectomy with transhiatal resection of the distal esophagus was the preferred approach in patients with Type III tumors.

Similarly, in patients with Type II tumors an attempt was made to achieve a complete tumor resection via an extended total gastrectomy with transhiatal subtotal resection of the esophagus with reconstruction using a tabularized distal stomach. The unresectability rate was 29% in type II and 30% in type III tumors.

For those who undergo potentially curative surgical resection, the 5-year survival rates are generally only 30%–40%. In many centers worldwide, surgery is considered the standard treatment for patients who are medically fit, and in whom a complete (R0) resection can be achieved.

Almost all cases of gastric pull up underwent pyloroplasty as a routine. We preferred mostly a midline abdominal incision and a Left neck incision for anastomosis. Ninety six % of cases were started on jejunostomy feeds on the 3rd Post operative day

Average duration for beginning of oral feeds was 5 days. It was delayed in 2 cases due to suspicion of neck leak.

In spite of effective preoperative evaluation, about 13 cases (28%) posted for definitive procedure were found to be inoperable. The signs of inoperability are

1. Involvement of aorta
2. Extensive pleural involvement
3. Ascites
4. Liver secondaries
5. Encasement of major vessels

Hand sewn neck anastomosis is equally found to be effective than staplers. End to side anastomosis which is preferred for esophagosatric anastomosis and is associated with less postop complications and good quality of life. Studies show morbidity is less with hand sewn anastomosis and there is less evidence of neck leak with hand sewn anastomosis.

TOTAL DURATION OF STAY IN THE HOSPITAL

No of days	Preop	%	Post op	Percentage
< 10 days	12	26.09	18	39.13
< 20 days	12	26.09	17	36.96
< 30 days	13	28.26	9	19.57
< 40 days	8	17.39	2	4.34
> 40 days	1	2.17	0	0

Median duration of preoperative hospitalization was 21.09 days(range 4- 44 days). Median duration of postoperative hospitalization was 16.37 days (range, 7–40 days). Two patients died on 3rd and 20th post operative day respectively.

OUTCOME AFTER SURGICAL RESECTION

The incidence of postoperative complications is summarized in chart 9.

POSTOPERATIVE COMPLICATION	OG GPT	THE GPT	DE + TG EJ	Total
Wound infection	2	3	1	6(18.18%)
Anastomotic leak	1	1	-	2(6%)
Respiratory complication	3	1	-	4(12.12%)
Cardiac complications	1	-	-	1(3%)
30 day mortality	1	1	-	2 (6%)
Overall	-	-	-	15 (45.5%)

The overall 30 day postoperative mortality after surgical resection was 2 patients (6%) , one developed respiratory failure due to pneumonia and the other died from myocardial infarction.

Patients with anastomotic leakage (6%) were successfully treated by postponement of oral feeding.

ADJUVANT THERAPY

All patients with resectable disease were given post operative radiotherapy. This has limited the number of recurrence to 3 patients in the mean follow period of 12 months (range 2 to 32 months)

Chart 8 SURGERY AND TUMOR TYPE

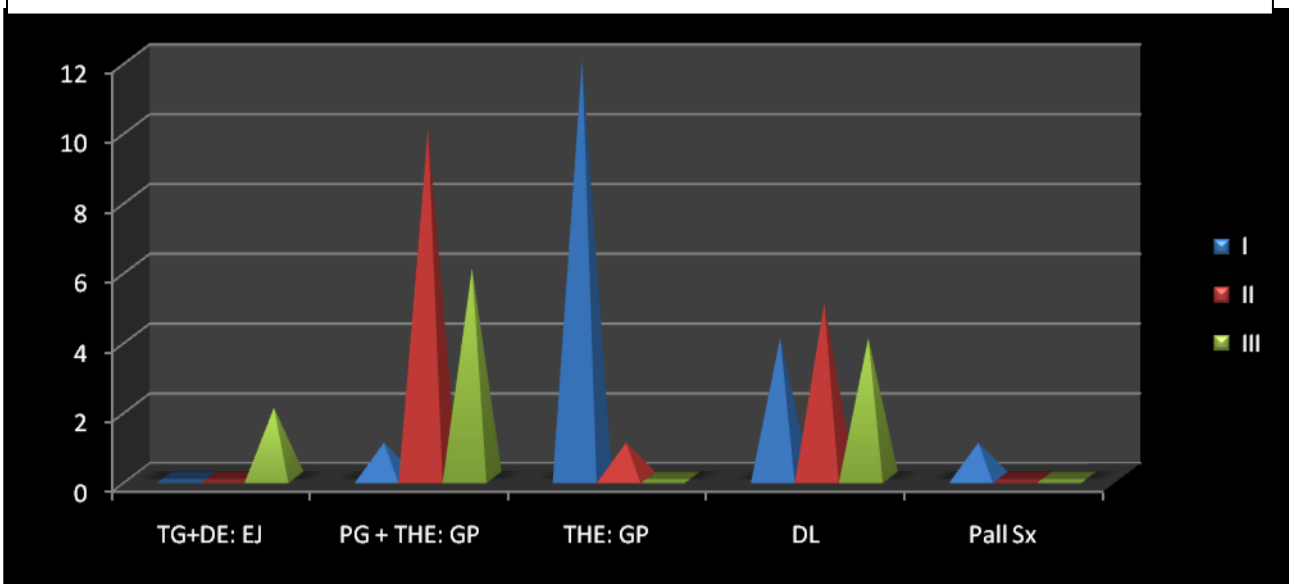
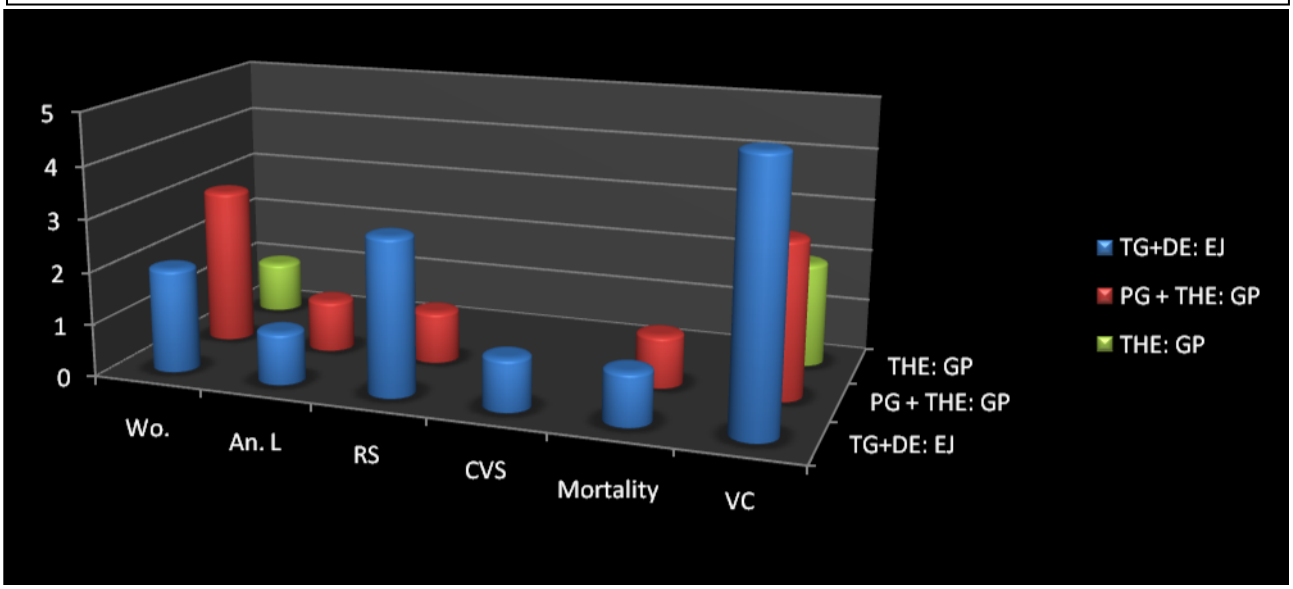


Chart 9 TYPE OF SURGERY AND POST OPERATIVE COMPLICATIONS



PALLIATIVE CARE

For patients whose disease could not be completely resected, 13 patients (28.2%) radiation therapy was the mainstay of treatment for patients who had locally advanced disease with no evidence of distant metastases. Feeding tubes were used for palliation of dysphagia in all 13 patients.

LONG TERM SURVIVAL

The mean duration of follow up was 5.35 months range from 1 to 32 months. During follow- up, 3 patients developed tumor recurrence of which they subsequently died (at 10, 15, and 32 months after surgery). Recurrences were initially detected as malignant pleural effusion, as bone metastases, or as anastomotic recurrence in combination with mediastinal lymph node involvement, respectively. In all three patients, the primary lesion had invaded the submucosal layer and lymph node metastasis was present at the time of esophagectomy. One patient died 26 months after resection of an intramucosal carcinoma without clinical signs of tumor recurrence (the patient had a history of cerebrovascular disease, which was the probable cause of death). Seven patients lost followup. Twenty-two patients were alive without recurrent disease after a median follow-up of 12 months (range, 2–32 months). The follow up period is too short to determine survival rate and long term prognosis. However the initial rates of survival were comparable to the Siewart's study.

Discussion & Summary

DISCUSSION

Our experience with 46 AEG tumors indicates that the subtypes differ in terms of epidemiology and histomorphologic tumor characteristics. In terms of surgical epidemiology Type II tumors are somewhere in the middle between Type I and III but with more resemblance to Type III than Type I tumors.

The preoperative staging of GE junction tumors needs careful review as a significant propotion of patients were diagnosed intraoperatively. Diagnostic lasparoscopy may be useful adjunct in predicting inoperability.

The analysis confirms, that a selection of the treatment strategy based on tumor type is justified .Surgical therapy of the various esophago–gastric junction tumors has now been standardized and can be performed with minimal risk for the patient.

This is underlined by the low postoperative mortality achieved in our population. Regarding the discussion on the most appropriate surgical procedure for esophago–gastric junction tumors, our data confirm that a discriminate approach is justified.

It is uniformly accepted that patients with AEG Type I tumors require an transhiatal esophagectomy in our population has shown good results in terms of minimum postoperative complications and long-term survival. The advantage over a intra thoracic anastomosis is that a neck anastomsis avoids complications due to an intra thoracic leak and allows early detection of anastomosis.

Partial gastrectomy with sub total esophagectomy is the procedure of choice for type II and III tumors at our institution. It is still an open question, whether an extended total gastrectomy is required for Type II tumors or whether a proximal gastrectomy with distal esophageal resection suffices

Provision of a good proximal and distal clearance is, however, mandatory when performing surgery in any tumor type. Feeding jejunostomy is a quick and uncomplicated procedure is a routine in this department. Its uses are

- Early postoperative nutrition
- To tide over an for anastomotic leak should it occur
- as palliation for dysphagia and is recommended in all patients

In the immediate postoperative period our mortality and morbidity rates are comparable to centres elsewhere and emphasizes the importance of good patient selection and preparation.

The analysis of outpatient population shows that postoperative mortality and long-term survival results were too short to compare survival rates reported in the literature. The overall prognosis is yet to be determined.

Our own experience with lymphadenectomy in our patients is limited.

1. Due to overall increase in morbidity and mortality to the patient
2. Due to the advanced nature of lesions we see, studies have shown that there is no overall improvement in survival

The value of multimodality therapy in patients with advanced tumors is being studied in our department currently.

Taken together, the selection of the surgical procedure based on the AEG Type I, II, and III classification of esophago–gastric junction tumors has proven valuable and results in good surgical outcomes. The subclassification of AEG tumors thus provides a useful tool for the selection of the surgical procedure and allows a better comparison of treatment results.

CONCLUSION

Tumors of the esophagogastric junction seem to be a distinct pathophysiologic entity, separate from esophageal and gastric carcinomas yet with some oncologic features of each. The classification of adenocarcinomas arising at or close to the esophago–gastric junction into Type I, II, and III tumors, originally introduced in 1987 has stood the test of time .The classification is practical and useful for the selection of the surgical approach and the extent of resection. Consequently it is increasingly employed worldwide .This results in a better understanding of the biology of these tumors and allows comparison of treatment results for the various tumor types between centers.

Accurate preoperative staging is crucial in the management of these tumors. Patients can be divided into two broad categories: those with resectable disease versus those with unresectable disease. Among the former group, the mainstay of treatment is surgical resection. The surgical strategy using differentiated approach is practical. The post operative morbidity is similar in the various surgical modalities and much emphasis lies on careful patient selection. The goal is an R0 resection with associated adequate lymphadenectomy. Patient and tumor characteristics help determine the optimal surgical approach for achieving R0 status.. Multimodal adjuvant therapy should be used liberally in patients to prevent post operative recurrence. Postoperative multimodal adjuvant therapy is beneficial in patients who are at high risk of local failure or of

developing systemic disease. In general, patients who may benefit from either neoadjuvant or adjuvant therapy should be encouraged to enroll in ongoing trials.

For patients whose disease cannot be completely resected, alternative measures exist for palliation of symptoms and control of local disease. Radiation therapy should be a mainstay for patients who have locally advanced disease with no evidence of distant metastases. Endoluminal stents and feeding tubes can be important tools for palliation of dysphagia. In advanced lesions, one must carefully consider the risks and morbidity of aggressive intervention versus the nonsurgical alternatives to palliate symptoms and provide the best quality of life for the patient.

Annexure

Master Chart

10	9	8	7	6	5	4	3	2	1	
Anbana than	Arul	Selvi	Sivakum ar	Shanti	Chittiba bu	Kanaga mma	Appasa my	Muniya ma	Anuma ndaya	**Name**
46	37	56	26	50	59	55	72	45	50	**Age**
M	M	F	M	F	M	M	M	F	M	**Sex**
787457	781159	776566	776866	775648	770520	769247	769013	756959	755678	**IP no**
16/2/06	12/2/06	26/1/06	5/10/05	10/8/05	2/6/05	17/5/05	17/4/05	20/3/05	10/3/05	**DOA**
16/3/06	2/2/06	5/1/06	12/10/0 5	2/9/05	9/6/05	21/5/05	21/4/05	11/4/05	27/3/05	**DOS**
6/4/06	22/2/06	12/1/06	22/10/0 5	12/9/05	26/6/05	27/4/05	30/4/05	20/4/05	15/4/05	**DOD**
Al, Sm	Sm	Nil	Sm	Oth	Al, Sm	nil	Al	Gord	Al, Mal	**Risks**
Dys	Wl	Rp	Dys	H	no	nil	Rp	Gerd	Rp	**Complain**
Nil	Nut.	Nil	Nil	IHD	Nil	IHD	Nil	Dia	IHD	**Comorbid disease**
1 T3N0	1 T3N0	3 T2N0	2 T1N0	1 T1N0	2 T1N0	3 T1N0	1 T2N0	2 T1N0	3 T2N0	**Type Stage**
AC,P G1	AC,U G1	AC,U G2	AC,P G1	AC,P G1	AC,P G2	AC, P G3	AC ,P G1	AC,E G2	AC,P G1	**Biopsy Preop**
THE GPT	Pall colo	INop	THE GPT	THE GPT	OG GPT	Inop	OG GPT	OG GPT	TG ReuxEJ	**Rx**
				W	R			A	W	**Comp.**
14 / RT	RT	RT	20/RT	15 /RT	8 recur	RT	default ed	26 \RT	32\RT	**Followup**

21	20	19	18	17	16	15	14	13	12	11
Uma	Muniya ma	Laksmi	Ponnus amy	Palania mmal	Pushpar aj	Karthike yan	Patel	Gowri	Varadar ajan	Saraswa thy
42	46	61	42	35	45	49	62	40	46	37
F	F	F	M	F	M	M	M	M	M	F
861821	878443	853129	836733	832934	820375	820511	804268	800628	882194	793064
2/4/07	2/4/07	28/2/07	7/2/07	10/12/0 7	1/10/06	21/6/06	2/6/06	20/3/06	1/5/06	1/4/06
22/4/07	22/4/07	11/4/07	27/3/07	10/1/07	12/10/0 6	22/7/06	22/6/06	30/5/06	10/5/06	25/4/06
10/5/07	10/5/07	25/4/07	11/4/07	25/1/07	20/10/0 6	12/8/06	7/7/06	25/6/06	20/05/0 6	25/5/06
Nil	Gerd	Nil	Al , Sm	Mal	Gord	Al, Sm	Mal	Sm	Al	Gord
Rp	Gerd	Epi	Rp	Wl	Gord	Nil	Epi	Dys	Nil	Gerd
Dia	Dia	Nil	IHD	Copd nut.	Nil	Nil	Dia	Nil	Nil	Nil
2 T2N0	2 T3N0	1 T2N0	1 T3N0	1 T2N0	2 T3N0	3 T2N0	1 T3N0	2 T3N0	2 T3N0	3 T2N0
AC,U G1	AC,P G2	AC,P G3	AC,E G2	AC,U G1	AC,U G1	AC,E G1	AC P,U G3	AC,P G3	AC,E G2	AC,P G2
INop	OG GPT	THE GPT	THE GPT	THE GPT	INop	PG OG anas	THE GPT	OG GPT	OG GPT	TG Reux EJ
	R		W					R		
default	5/RT	8/RT	8/RT	9/RT	RT	10/RT/ RECUR	13/RT	12/RT	17/RT	16/RT

32	31	30	29	28	27	26	25	24	23	22
Anuma n daya	Munirat hinam	Manime galai	Seethai aman	Baser	Dhanap al	Munirat hinam	Manime galai	Selvi	Ramasa my	a nyad basha
35	54	56	35	22	57	57	50	35	46	63
F	M	F	M		M	M	F	F	M	F
870068	879397	885699	878728	876632	878413	875413	872509	862375	868821	863485
25/9/07	15/7/06	1/9/07	13/9/07	1/10/07	3/9/07	12/7/07	12/7/07	1/6/07	15/4/07	1/4/07
12/10/06	22/7/06	1/10/07	8/9/07	10 /9 07	2/9/07	22/8/07	12/7/07	17/6/07	20/5/07	30/4/07
29/10/06	1/8/07	3/10/07	3/10/07	18/7/07	15/9/07	12/9/07	22/7/07	29/5/07	27/5/07	30/5/07
Mal	Al,Sm	oth	Nil	Al	Al, Sm	Sm	Nil	Nil	Al	Nil
Nil	Rp	Rp	Nil	Dys	Epi	Wl	Nil	H	Dys	Wl
Dia		Nil	IHD, Asth	Nil	Dia	Copd Nut.	Nil	IHD	Copd	Nil
3 T2N0	1 T3N0	3 T1N0	2 T3N0	3 T1N0	2 T2N0	2 T3N0	1 T2N0	1 T2N0	2 T3N0	1 T1N0
AC,P G2	AC,P G3	AC,P G1	AC,P G2	AC,U G1	AC,P G1	AC,P G1	AC,P G1	AC,P G3	AC,P G2	AC,P G1
OG GPT	INop	OG GPT	OG GPT	Inop	OG GPT	OG GPT	THE GPT	THE GPT	INop	THE GPT
W		D,C	R			W				
10/FT	RT	-	default	RT	2 RT	1 RT	3 RT	3/RT	RT	5/RT

43	42	41	40	39	38	37	36	35	34	33
Boophal an	Govind a samy	Arunth a mary	Manjula	Ramac handra	Lakshmi	Louis	Jayaku mar	Saroja	Kanaga mmal	Raman
65	49	38	37	40	46	64	55	50	40	75
M	M	F	F	M	F	M	M	F	M	M
875413	872509	862375	863485	861821	853129	880101	836733	871959	871678	871903
8/8/07	5/8/07	10/8/07	1/6/07	1/5/07	20/3/07	17/3/07	17/3/07	11/3/07	20/7/07	1/1/07
10 /9/07	2/9/07	22/8/07	17/6/07	20/5/07	30/4/07	22/4/07	22/4/07	11/4/07	27/3/07	10/1/07
10/10/0 7	9/9/07	1/9/07	25/6/07	6/6/07	15/5/07	2/5/07	2/5/07	11/5/07	18/7/07	20/2/07
Al	Al	Nil	Gord	Al	Gord	AL,Sm	Al	Mal	Sm	Al
H,	Nil	Wl	Gord,	Dys	Gord	Epi	Nil	Rp	Nil	Epi
		Nut.		Dia, Copd			IHD		IHD	
3 T3N0	1 T3N0	1 T3N0	3 T3N0	1 T2N0	2 T3N0	2 T2N0	3 T1N0	1 T3N0	2 T2N0	1 T3N0
AC,E G1	AC,U G2	AC,P G2	AC,P G3	AC,P G1	AC,U G3	AC,P G1	AC,P G2	AC,U G1	AC,E G1	AC,P G3
OG GPT	Inop	Inop	Inop	THE GPT	OG GPT	Inop	OG GPT	THE GPT	OG GPT	THE GPT
				W		D		R		A
default	RT	RT	RT	3 recur	default	4/ RT	4/ RT	default	recur	8/RT

46	45	44
Kumar	Rathina m	Karupp usamy
57	74	70
M	M	M
883017	876632	876632
14/9/07	14/9/07	7/9/07
1/10/07	1/10/07	8/9/07
12/10/07	12/10/07	11/10/07
Al	Nil	Al
Nil	H	Rp
		Dia
3 T1N0	1 T2N0	2 T2N0
AC,EG2	AC,UG1	AC,PG3
OG GPT	Inop	Inop
1	RT	RT

ABBREVIATIONS AND KEY TO THE MASTER CHART

GE junction:	Gastroesophageal junction
GERD:	Gastroesophageal reflux disease
OGD:	Esophagogastroduodenoscopy
CT:	Computerized Tomogram
USG:	Ultrasonogram

DOA: DATE OF ADMISSION

DOS : DATE OF SUREGRY

DOD: DATE OF DISCHARGE

G: GRADE

AC: ADENOCARNIMOMA

Sm: SMOKER

Al: ALCOHOLIC

GORD: GASTROESOPHAGEAL REFLUX DISEASE

Mal: MALNUTRITION

RP: RESTROSTERNAL CHEST PAIN

Dys: DYSPHAGIA

Wl: WEIGHT LOSS

Epi: EPIGASTRIC PAIN

Dia: DIABETES

IHD: CARDIAC DISEASE

P: PROLIFERATIVE

U: ULCERATIVE

E: ELEVATED

TG Reux EJ: trans hiatal esophagectomy with refux esophagojejunostomy

OG GPT: oesophagogastrectomy with gastric pull through

Inop: Inoperable

THE GPT: trans hiatal esophagectomy with gastric pull through

Pall Colo: Palliative coloplasty

PG OG: partial gastrectomy with esophagogasric anastomosis

W: WOUND INFECTION

R: RESPIRATORY COMPLICATION

C: CARDIAC COMPLICATION

D: DEATH

N\RT: NO OF MONTHS FOLLOWUP \RT

Proforma

PROFORMA FOR THE STUDY OF GASTROESOPHAGEAL MALIGNANCIES

NAME: I.P. NO: CASE NO:

AGE: UNIT:

SEX:

I. PRESENTING COMPLAINTS

History of GERD symptoms	
Hematemesis/melena	
Retrosternal pain	
No symptoms	
Epigastric pain	
Dysphagia	
Weight loss	

II. PAST HISTORY

III. PERSONAL HISTORY

SMOKING	
ALCOHOL	
GORD	
MALNUTRITION	
OTHERS	
NIL	

IV. TREATMENT HISTORY

V. GENERAL EXAMINATION

BUILD	
NOURISHMENT	
PERFORMANCE STATUS	
PALLOR	
ICTERUS	
CYANOSIS	
PEDAL EDEMA	
LYMPHADENOPATHY	
VITALS	
PULSE RATE	
RESPIRATORY RATE	
BLOOD PRESSURE	

VI. LOCAL EXAMINATION:

ASCITES	
HEPATOMEGALY	
PERRECTAL EXAM	

VII. OTHER SYSTEMS

CVS	
RS	
SPINE, CRANIUM,LONG BONES	

VIII. SPECIALIST OPINION

CARDIOLOGY	
DIABETOLOGY	
PULMONOLOGY	

IX. BASIC INVESTIGATIONS

HB% / PCV	
TC /DC	
ESR	
UREA, CREATININE	
BLOOD SUGAR	
LIVER FUNCTION TEST	
ECG	
CHEST AND ABDOMINAL SKIAGRAM	

X. SPECIAL INVESTIGATIONS

BARIUM SWALLOW	
ENDOSCOPY LOCATION EXTENT	
HISTOPATHOLOGY CELL TYPE GRADE	
CT ABDOMEN	
CT THORAX	
POST OP HISTOPATHLOGY	

XI. DIAGNOSIS

XII. TREATMENT

PRESURGERY STAY	
PREOPTIMISATION	
RESECTABLE OR NOT	
TYPE OF RESECTION	

TYPE OF RECONSTRUCTION	
INTRAOP COMPLICATIONS	
POSTSURGERY STAY	
POSTOP COMPLICATIONS	

XIII. FOLLOW UP

POST OP ADJUVANT THERAPY	
DURATION OF FOLLOW UP	
COMPLICATIONS	
RECURRENCE	

Bibliography

REFERENCES

1 Blot WJ, Devesa SS, KnellerRWet al. Rising incidence of adenocarcinoma of the esophagus and gastric cardia. JAMA 1991;265:1287–1289.

2 Pera M, Cameron AJ, Trastek VF et al. Increasing incidence of adenocarcinoma of the esophagus and esophagogastric junction. Gastroenterology 1993;104:510 –513.

3 Devesa SS, Blot WJ, Fraumeni JF Jr. Changing patterns in the incidence of esophageal and gastric carcinoma in the United States. Cancer 1998;83: 2049–2053.

4 Lerut T, Nafteux P, Moons J et al. Three-field lymphadenectomy for carcinoma of the esophagus and gastroesophageal junction in 174 R0 resections:Impact on staging, disease-free survival, and outcome: A plea for adaptation of TNM classification in upper-half esophageal carcinoma. Ann Surg 2004;240:962–972; discussion 972–974.

5 Ajani JA, Walsh G, Komaki R et al. Preoperative induction of CPT-11 and cisplatin chemotherapy followed by chemoradiotherapy in patients with locoregional carcinoma of the esophagus or gastroesophageal junction. Cancer 2004;100:2347–2354.

6 Hulscher JB, Tijssen JG, Obertop H et al. Transthoracic versus transhiatal resection for carcinoma of the esophagus: A meta-analysis. Ann Thorac Surg 2001;72:306 –313.

7 Allum WH, Powell DJ, McConkey CC et al. Gastric cancer: A 25-year review. Br J Surg 1989;76:535–540.

8 de Manzoni G, Pedrazzani C, Pasini F et al. Results of surgical treatment of adenocarcinoma of the gastric cardia. Ann Thorac Surg 2002;73:1035– 1040.

9 Rudiger Siewert J, Feith M, Werner M et al. Adenocarcinoma of the esophagogastric junction: Results of surgical therapy based on anatomical/ topographic classification in 1,002 consecutive patients. Ann Surg 2000; 232:353–361.

10 Graham AJ, Finley RJ, Clifton JC et al. Surgical management of adenocarcinoma of the cardia. Am J Surg 1998;175:418–421.

11 Wijnhoven BP, Siersema PD, HopWCet al. Adenocarcinomas of the distal oesophagus and gastric cardia are one clinical entity: Rotterdam Oesophageal Tumour Study Group. Br J Surg 1999;86:529 –535.

12 Mariette C, Castel B, Toursel H et al. Surgical management of and longterm survival after adenocarcinoma of the cardia. Br J Surg 2002;89:1156– 1163.

13 Husemann B. Cardia carcinoma considered as a distinct clinical entity. Br J Surg 1989;76:136 –139.

14 Siewert JR, Stein HJ. Classification of adenocarcinoma of the oesophagogastric junction. Br J Surg 1998;85:1457–1459.

15 Rice TW, Blackstone EH, Adelstein DJ et al. Role of clinically determined depth of tumor invasion in the treatment of esophageal carcinoma. J Thorac Cardiovasc Surg 2003;125:1091–1102.

16 Rosch T. Endoscopic ultrasonography. Endoscopy 1994;26:148 –168.

17 DeWitt J, Kesler K, Brooks JA et al. Endoscopic ultrasound for esophageal and gastroesophageal junction cancer: Impact of increased use of primary neoadjuvant therapy on preoperative locoregional staging accuracy. Dis Esophagus 2005;18:21–27.

18 Kelly S, Harris KM, Berry E et al. A systematic review of the staging performance of endoscopic ultrasound in gastro-oesophageal carcinoma. Gut 2001;49:534 –539.

19 Tio TL, Cohen P, Coene PP et al. Endosonography and computed tomography of esophageal carcinoma: Preoperative classification compared to the new (1987) TNM system. Gastroenterology 1989;96:1478 –1486.

20 Van Overhagen H, Lameris JS, Berger MY et al. Improved assessment of supraclavicular and abdominal metastases in oesophageal and gastroesophageal junction carcinoma with the combination of ultrasound and computed tomography. Br J Radiol 1993;66:203–208.

Gee, Rattner 183

21 Finch MD, John TG, Garden OJ et al. Laparoscopic ultrasonography for staging gastroesophageal cancer. Surgery 1997;121:10 –17.

22 Nieveen van Dijkum EJ, de Wit LT, van Delden OM et al. Staging laparoscopy and laparoscopic ultrasonography in more than 400 patients with upper gastrointestinal carcinoma. J Am Coll Surg 1999;189:459–465.

23 Siewert JR, Stein HJ, Sendler A et al. Surgical resection for cancer of the cardia. Semin Surg Oncol 1999;17:125–131.

24 Ito H, Clancy TE, Osteen RT et al. Adenocarcinoma of the gastric cardia: What is the optimal surgical approach? JAmColl Surg 2004;199:880–886.

25 Kodera Y, Yamamura Y, Shimizu Y et al. Adenocarcinoma of the gastroesophageal junction in Japan: Relevance of Siewert's classification applied to 177 cases resected at a single institution. J Am Coll Surg 1999;189:594–601.

26 Mattioli S, Di Simone MP, Ferruzzi L et al. Surgical therapy for adenocarcinoma of the cardia: Modalities of recurrence and extension of resection. Dis Esophagus 2001;14:104 –109.

27 Goldminc M, Maddern G, Le Prise E et al. Oesophagectomy by a transhiatal approach or thoracotomy: A prospective randomized trial. Br J Surg 1993;80:367–370.

28 Chu KM, Law SY, Fok M et al. A prospective randomized comparison of transhiatal and transthoracic resection for lower-third esophageal carcinoma. Am J Surg 1997;174:320 –324.

29 Dresner SM, Lamb PJ, Bennett MK et al. The pattern of metastatic lymph node dissemination from adenocarcinoma of the esophagogastric junction. Surgery 2001;129:103–109.

30 Lim L, Michael M, Mann GB et al. Adjuvant therapy in gastric cancer. J Clin Oncol 2005;23:6220–6232.

31 Maruyama K, Gunven P, Okabayashi K et al. Lymph node metastases of gastric cancer: General pattern in 1931 patients. Ann Surg 1989;210:596– 602.

32 Altorki NK, Girardi L, Skinner DB. En bloc esophagectomy improves survival for stage III esophageal cancer. J Thorac Cardiovasc Surg 1997;114: 948–955; discussion 955–966.

33 Karpeh MS, Leon L, Klimstra D et al. Lymph node staging in gastric cancer: Is location more important than number? An analysis of 1,038 patients.Ann Surg 2000;232:362–371.

34 Bouvier AM, Haas O, Piard F et al. How many nodes must be examined to accurately stage gastric carcinomas? Results from a population based study. Cancer 2002;94:2862–2866.

35 Bozzetti F. Principles of surgical radicality in the treatment of gastric cancer.
Surg Oncol Clin N Am 2001;10:833– 854, ix.

36 Hartgrink HH, van de Velde CJ, Putter H et al. Extended lymph node dissection
for gastric cancer: Who may benefit? Final results of the randomized
Dutch Gastric Cancer Group trial. J Clin Oncol 2004;22:2069 –2077.

37 Cuschieri A, Weeden S, Fielding J et al. Patient survival after D1 and D2
resections for gastric cancer: Long-term results of the MRC randomized
surgical trial. Surgical Co-operative Group. Br J Cancer 1999;79:1522– 1530.

38 Bonenkamp JJ, Hermans J, Sasako M et al. Extended lymph-node dissection
for gastric cancer. N Engl J Med 1999;340:908 –914.

39 Degiuli M, Sasako M, Calgaro M et al. Morbidity and mortality after D1

and D2 gastrectomy for cancer: Interim analysis of the Italian Gastric Cancer Study Group (IGCSG) randomised surgical trial. Eur J Surg Oncol 2004;30:303–308.

40 Yu W, Choi GS, Chung HY. Randomized clinical trial of splenectomy versus splenic preservation in patients with proximal gastric cancer. Br J Surg 2006;93:559 –563.

41 Sihvo EI, Luostarinen ME, Salo JA. Fate of patients with adenocarcinoma of the esophagus and the esophagogastric junction: A population-based analysis. Am J Gastroenterol 2004;99:419–424.

42 Isono K, Sato H, Nakayama K. Results of a nationwide study on the threefield lymph node dissection of esophageal cancer. Oncology 1991;48:411– 420.

43 Akiyama H, Tsurumaru M, Kawamura T et al. Principles of surgical treatment for carcinoma of the esophagus: Analysis of lymph node involvement. Ann Surg 1981;194:438–446.

44 Matsubara T, Ueda M, YanagidaOet al. How extensive should lymph node dissection be for cancer of the thoracic esophagus? J Thorac Cardiovasc Surg 1994;107:1073–1078.

45 Hundahl SA, Macdonald JS, Benedetti J et al. Surgical treatment variation in a prospective, randomized trial of chemoradiotherapy in gastric cancer: The effect of undertreatment. Ann Surg Oncol 2002;9:278 –286.

46 Peeters KC, Hundahl SA, Kranenbarg EK et al. Low Maruyama index surgery for gastric cancer: Blinded reanalysis of the Dutch D1–D2 trial. World J Surg 2005;29:1576 –1584.

47 Macdonald JS, Smalley SR, Benedetti J et al. Chemoradiotherapy after surgery compared with surgery alone for adenocarcinoma of the stomach or gastroesophageal junction. N Engl J Med 2001;345:725–730.

48 Kattan MW, Karpeh MS, Mazumdar M et al. Postoperative nomogram for disease-specific survival after an R0 resection for gastric carcinoma. J Clin Oncol 2003;21:3647–3650.

49 Peeters KC, Kattan MW, Hartgrink HH et al. Validation of a nomogram for predicting disease-specific survival after an R0 resection for gastric carcinoma.Cancer 2005;103:702–707.

50 Kitagawa Y, Fujii H, Kumai K et al. Recent advances in sentinel node navigation for gastric cancer: A paradigm shift of surgical management. J Surg Oncol 2005;90:147–151; discussion

51 Kitagawa Y, Kitajima M. Gastrointestinal cancer and sentinel node navigation surgery. J Surg Oncol 2002;79:188 –193.

52 Yasuda S, Shimada H, Chino O et al. Sentinel lymph node detection with Tc-99m tin colloids in patients with esophagogastric cancer. Jpn J Clin Oncol 2003;33:68 –72.

53 Walsh TN, Noonan N, Hollywood D et al. A comparison of multimodal therapy and surgery for esophageal adenocarcinoma. N Engl J Med 1996; 335:462– 467.

54 Fiorica F, Di Bona D, Schepis F et al. Preoperative chemoradiotherapy for oesophageal cancer: A systematic review and meta-analysis. Gut 2004;53: 925–930.

55 Plukker JT, Mulder NH, Sleijfer DT et al. Chemotherapy and surgery for locally advanced cancer of the cardia and fundus: Phase II study with methotrexate and 5-fluorouracil. Br J Surg.

56 Plukker JT, Sleijfer DT, Verschueren RC et al. Neo-adjuvant chemotherapy with carboplatin, 4-epiadriamycin and teniposide (CET) in locally advanced cancer of the cardia and the lower oesophagus: A phase II study. Anticancer Res 1995;15:2357–2361.

57 Rougier P, Mahjoubi M, Lasser P et al. Neoadjuvant chemotherapy in locally advanced gastric carcinoma—a phase II trial with combined continuous intravenous 5-fluorouracil and bolus cisplatinum. Eur J Cancer 1994; 30A:1269–1275.

58 Melcher AA, Mort D, Maughan TS. Epirubicin, cisplatin and continuous infusion 5-fluorouracil (ECF) as neoadjuvant chemotherapy in gastroesophageal cancer. Br J Cancer 1996;74:1651–1654.

59 Management of Gastroesophageal Tumors Downloaded from www.TheOncologist.com by on November 16, 2007 59 Waters JS, Norman A, Cunningham D et al. Long-term survival after epirubicin, cisplatin and fluorouracil for gastric cancer: Results of a randomized trial. Br J Cancer 1999;80:269 –272.

60 Wils JA, Klein HO, Wagener DJ et al. Sequential high-dose methotrexate and fluorouracil combined with doxorubicin—a step ahead in the treatment of advanced gastric cancer: A trial of the European Organization for Research and Treatment of Cancer Gastrointestinal Tract Cooperative Group. J Clin Oncol 1991;9:827– 831.

61 Kelsen D, Atiq OT, Saltz L et al. FAMTX versus etoposide, doxorubicin, and cisplatin: A random assignment trial in gastric cancer. J Clin Oncol 1992;10:541–548.

62 Webb A, Cunningham D, Scarffe JH et al. Randomized trial comparing epirubicin, cisplatin, and fluorouracil versus fluorouracil, doxorubicin, and methotrexate in advanced esophagogastric cancer. J Clin Oncol 1997;15: 261–267.

63 Wagner AD, Grothe W, Behl S et al. Chemotherapy for advanced gastric cancer. Cochrane Database Syst Rev 2005:CD004064.

64 Kaklamanos IG, Walker GR, Ferry K et al. Neoadjuvant treatment for resectable cancer of the esophagus and the gastroesophageal junction: A meta-analysis of randomized clinical trials. Ann Surg Oncol 2003;10:754– 761.

65 Cunningham D, Allum WH, Stenning SP et al. Perioperative chemotherapy versus surgery alone for resectable gastroesophageal cancer. N Engl J Med 2006;355:11–20.

66 Pozzo C, Barone C, Szanto J et al. Irinotecan in combination with 5-fluorouracil and folinic acid or with cisplatin in patients with advanced gastric or esophageal-gastric junction adenocarcinoma: Results of a randomized phase II study. Ann Oncol 2004;15:1773–1781.

70 Adelstein DJ, Rice TW, Boyce GA et al. Adenocarcinoma of the esophagus and gastroesophageal junction: Clinical and pathologic assessment of response to induction chemotherapy. Am J Clin Oncol 1994;17:14 –18.

71 Stewart JR, Hoff SJ, JohnsonDHet al. Improved survival with neoadjuvant therapy and resection for adenocarcinoma of the esophagus. Ann Surg 1993;218:571–576; discussion

72 Ajani JA, Roth JA, Ryan MB et al. Intensive preoperative chemotherapy with colony-stimulating factor for resectable adenocarcinoma of the esophagus or gastroesophageal junction. J Clin Oncol 1993;11:22–28.

73 Nygaard K, Hagen S, Hansen HS et al. Pre-operative radiotherapy prolongs survival in operable esophageal carcinoma: A randomized, multicenter study of pre-operative radiotherapy and chemotherapy. The second Scandinavian trial in esophageal cancer. World J Surg 1992;16:1104 –1109; discussion 1110.

74 Urba SG, Orringer MB, Turrisi A et al. Randomized trial of preoperative chemoradiation versus surgery alone in patients with locoregional esophageal carcinoma. J. Clin Oncol 2001;19:305–313.

75 Apinop C, Puttisak P, Preecha N. A prospective study of combined therapy in esophageal cancer. Hepatogastroenterology 1994;41:391–393.

76 Bosset JF, Gignoux M, Triboulet JP et al. Chemoradiotherapy followed by surgery compared with surgery alone in squamous-cell cancer of the esophagus. N Engl J Med 1997;337:161–167.

77 Le Prise E, Etienne PL, Meunier B et al. A randomized study of chemotherapy, radiation therapy, and surgery versus surgery for localized squamous cell carcinoma of the esophagus. Cancer 1994;73:1779 –1784.

78 Roth JA, Pass HI, Flanagan MM et al. Randomized clinical trial of preoperative and postoperative adjuvant chemotherapy with cisplatin, vindesine, and bleomycin for carcinoma of the esophagus. J Thorac Cardiovasc Surg 1988;96:242–248.

79 Maipang T, Vasinanukorn P, Petpichetchian C et al. Induction chemotherapy in the treatment of patients with carcinoma of the esophagus. J Surg Oncol 1994;56:191–197.

80 Law S, Fok M, Chow S et al. Preoperative chemotherapy versus surgical therapy alone for squamous cell carcinoma of the esophagus: A prospective randomized trial. J Thorac Cardiovasc Surg 1997;114:210 –217.

81 Kelsen DP, Ginsberg R, Pajak TF et al. Chemotherapy followed by surgery compared with surgery alone for localized esophageal cancer. N Engl J Med 1998;339:1979 –1984.

83 Iyer R, Wilkinson N, Demmy T et al. Controversies in the multimodality management of locally advanced esophageal cancer: Evidence-based review of surgery alone and combined-modality therapy. Ann Surg Oncol 2004;11:665– 673.

84 Valverde CM, Macarulla T, Casado E et al. Novel targets in gastric and esophageal cancer. Crit Rev Oncol Hematol 2006;59:128 –138.

85 Hundahl SA, Phillips JL, Menck HR. The National Cancer Data Base Report on poor survival of U.S. gastric carcinoma patients treated with gastrectomy: Fifth Edition American Joint staging, proximal disease, and the “different disease” hypothesis. Cancer 2000;88:921–932.

86 Landry J, Tepper JE, Wood WC et al. Patterns of failure following curative resection of gastric carcinoma. Int J Radiat Oncol Biol Phys 1990;19:1357– 1362.

88 Mc NG, Vandenberg H Jr, Donn FY et al. A critical evaluation of subtotal gastrectomy for the cure of cancer of the stomach. Ann Surg 1951;134:2–7.

89 Thomson FB, Robins RE. Local recurrence following subtotal resection for gastric carcinoma. Surg Gynecol Obstet 1952;95:341–344.

90 Hermans J, Bonenkamp JJ, Boon MC et al. Adjuvant therapy after curative resection for gastric cancer: Meta-analysis of randomized trials. J Clin Oncol 1993;11:1441–1447.

91 Earle CC, Maroun JA. Adjuvant chemotherapy after curative resection for gastric cancer in n-Asian patients: Revisiting a meta-analysis of randomized trials. Eur J Cancer 1999;35: 4.

92 Moertel CG, Childs DS, O'Fallon JR et al. Combined 5-fluorouracil and radiation therapy as a surgical adjuvant for poor prognosis gastric carcinoma. J Clin Oncol 1984;2:1249 –1254.

93 Sihvo EI, Pentikainen T, Luostarinen ME et al. Inoperable adenocarcinoma of the oesophagogastric junction: A comparative clinical study of laser coagulation versus self-expanding metallic stents with special reference to cost analysis. Eur J Surg Oncol 2002;28: